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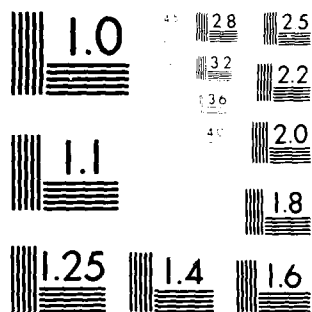
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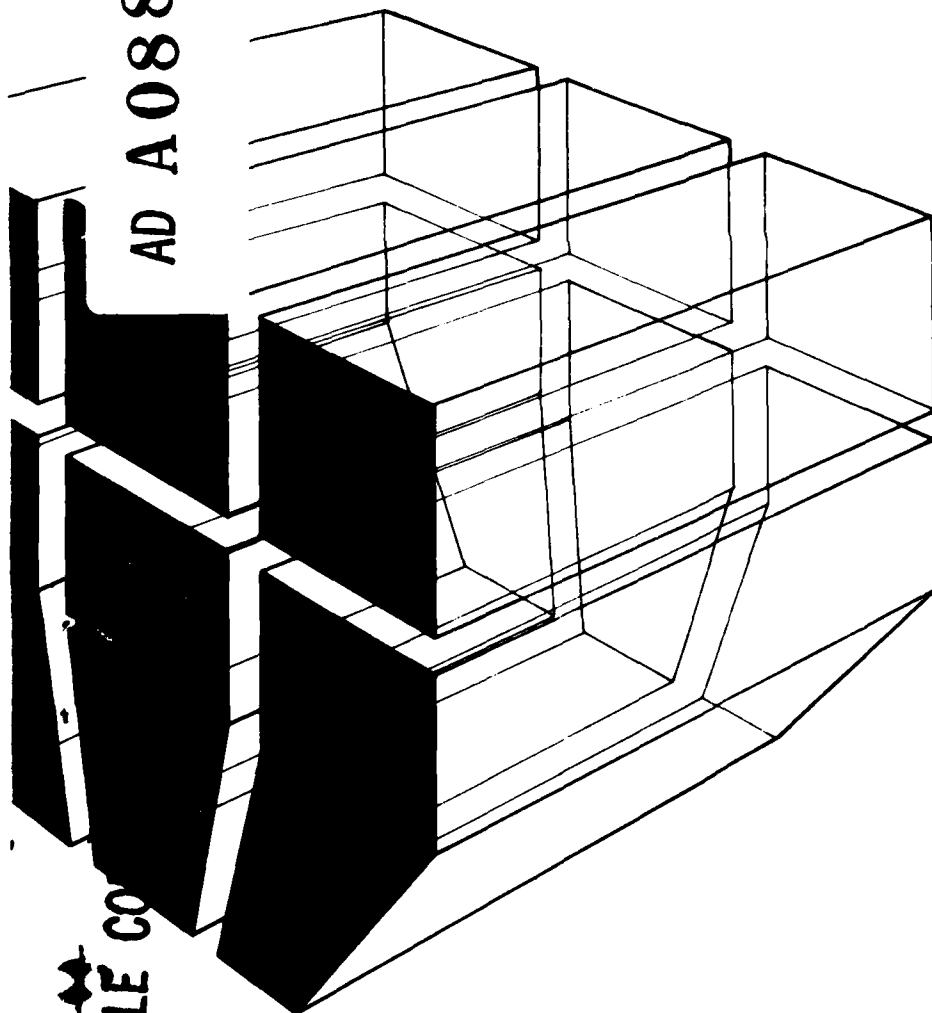
August 1980

Hazardous and Toxic Waste Management

HAZARDOUS WASTE SURVEYS OF TWO ARMY
INSTALLATIONS AND AN ARMY HOSPITAL

AD A088260

by
D. Kraybill
T. Mullen
B. Donahue



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➤ This study examined hazardous waste production at two military installations and a major Army hospital. Six major hazardous wastes were found: (1) waste oil/petroleum oil lubricant (POL) products, (2) solvent tank bottom sludges, (3) paint wastes, (4) pesticides and insecticides, (5) PCBs, and (6) medical/infectious wastes.

Descriptions of the study surveys as they were conducted are given. A hazardous waste survey format, developed during this study for use by Facilities Engineers, is also provided. ←

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FOREWORD

This study was conducted by the Environmental Division (EN) of the U.S. Army Corps of Engineers, Construction Engineering Research Laboratory (CERL) for the Directorate of Military Programs, Office of the Chief of Engineers, under Project 4A762720A896, "Environmental Quality for Construction and Operations of Military Facilities"; Task Area B, "Source Reduction Control and Treatment"; Work Unit 028, "Hazardous and Toxic Waste Management." Mr. Walter Medding was the OCE Technical Monitor. Mr. B. A. Donahue of CERL-EN was Principal Investigator. Dr. E. W. Novak is Acting Chief of CERL-EN.

COL Louis J. Circeo is Commander and Director of CERL and Dr. L. R. Shaffer is Technical Director.

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HAZARDOUS WASTE SURVEYS OF TWO ARMY INSTALLATIONS AND AN ARMY HOSPITAL

1 INTRODUCTION

Background

The ever-increasing industrialization of society, coupled with an equally increasing environmental and health safety awareness, has created a long list of wastes and by-products which are potentially hazardous to health and the environment. Many substances which are used daily can be hazardous if not disposed of properly, e.g., waste motor oil, PCBs, insecticides, and many spent solvents.

Congress addressed these and other solid waste problems in the Resource Conservation and Recovery Act of 1976.¹ In Subtitle C of this act, the Environmental Protection Agency (EPA) is charged with the promulgation of various regulations and standards for hazardous waste management. Among these duties is the establishment of a list of materials that the EPA considers hazardous.

The EPA has since published *Proposed Guidelines and Regulations and Proposal on Identification and Listing of Hazardous Waste*; these proposed regulations list criteria for identifying waste considered hazardous by the EPA and industrial processes which generate hazardous waste.²

Such regulations could have considerable impact on military installations. While the solid waste from an Army installation is similar to that of a city of similar size, military installations are unique in that they produce considerable quantities of wastes not normally associated with civilian industry, e.g., wastes from weapons-related activities and motor pools.

Objective

The objective of this study was to provide guidelines and a format that Facilities Engineers (FEs) can use to conduct installation hazardous waste surveys.

Approach

The requirements for Army hazardous waste identification were determined by analyzing the EPA-proposed hazardous waste guidelines and regulations. A survey format was then established and tested by surveying two Army installations and an Army hospital.

Scope

This study examined only two FORSCOM installations and a major Army hospital. The intent of this study was not to quantify Army-wide hazardous waste problems, but rather to identify areas which deserve emphasis in a survey and to recommend methods for surveying similar installations.

¹ *Resource Conservation and Recovery Act of 1976*, Public Law (PL) 94-580 90 Stat 279550 (21 October 1976).

² "Proposed Guidelines and Regulations and Proposal on Identification and Listing of Hazardous Waste," *Federal Register*, Vol 43, No. 243 (18 December 1978).

Mode of Technology Transfer

The results of this study will be used to revise *Solid Waste Management, Army Regulation* (AR) 420-47 (Department of the Army, 9 June 1977).

2 DEFINITIONS AND INFORMATION SOURCES

Definitions of Hazardous Waste

Hazardous waste has been defined in the Resource Conservation and Recovery Act of 1976 as "a solid waste or combination of solid waste, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may:

"1. Cause or contribute to an increase in mortality, or an increase in serious irreversible or incapacitating, reversible illness; or

"2. Pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed."³

The Resource Conservation Recovery Act includes wastes that are liquid in nature but cannot be disposed of in a sanitary sewer (e.g., PCBs, waste DDT, waste lubricating oil).

In the EPA-proposed hazardous waste regulations, eight specific categories of hazard are identified: (1) ignitability, (2) corrosivity, (3) reactivity, (4) toxicity, (5) radioactivity, (6) infectiousness, (7) phytotoxicity, and (8) teratogenicity and mutagenicity.

The tests for these properties are not necessarily the same as similar tests used in other sciences (e.g., the standard test for ignitability is not the same as the standard test for flammability). At the time of publication of the EPA-proposed regulations, tests had been developed for only the first four categories of hazard.⁴

EPA List of Hazardous Wastes

The EPA-proposed regulations establish a tentative list of hazardous waste materials which fall into the eight categories given above. This list is in two parts: the first is a generalized list which shows 19 waste categories ranging from solvents to waste oils to cleanup residues from hazardous material spills (Table 1); the second part lists processes which generate hazardous waste, classifying them by Standard Industrial Classification (SIC) numbers. Figure 1 is a short sample from this process list.

Three appendices to the EPA-proposed regulations are also worth noting. Appendix III lists selected cancelled and Rebuttable Presumption Against Registration (RPAR) pesticides (e.g., Chloranil, Kepone, Polychlorinated Terphenyl, and 2,4,5-T). Appendix IV lists materials which carry a Department of Transportation classification of Poison A, Poison B, and ORM-A substances. Appendix V, called "Selected Priority Pollutants," lists 93 chemical compounds which the EPA considers hazardous.

The EPA's hazardous waste list refers not only to the wastes themselves, but also to containers which have held the waste (unless they have been treated in a specific way).

Government Listings and Hazardous Materials Information

Information on hazardous materials is available from many sources within the Federal government and the Department of Defense (DOD). Of particular importance is the Navy's Consolidated Hazardous Item List (CHIL), the Defense Logistics Agency's Hazardous Materials Information System (HMIS), The Army Environmental Hygiene Agency's (AEHA) Industrial Health Hazards Inventory.

³ Resource Conservation and Recovery Act, PL 94-550, Stat 5.2150 (21 October 1976).

⁴ "Proposed Hazardous Waste Guidelines and Regulations," *Federal Register*, Vol 43, No. 243 8 (December 1978).

Table 1
EPA Hazardous Waste Categories

1. Waste chlorinated hydrocarbons of degreasing operations
2. Waste nonhalogenated solvents
3. Waste lubricating oil
4. Waste hydraulic or cutting oil
5. Paint wastes
6. Water-based paint waste
7. Tank bottoms, leaded
8. Spent or waste cyanide solutions or sludges
9. Etching acid solutions or sludges
10. Waste paint and varnish remover
11. Solvents and solvent recovery still bottoms (halogenated)
12. Solvents and solvent recovery still bottoms (nonhalogenated)
13. Waste or off-spec toluene diisocyanate
14. Leachate from hazardous waste landfills
15. Electroplating wastewater treatment sludge
16. Material which is within the scope of Section 250.10(b) using a name listed in Appendices III, IV, or V
17. Off-spec material listed as above (Item 16)
18. Spill cleanup residues and debris from material listed in Item 16
19. Containers, unless triple-rinsed, which have contained materials listed in Item 16

SIC	Process Description
1094	Waste rock and overburden from uranium mining
2874	Waste gypsum from phosphorus acid production
2812	Mercury-bearing brine purification muds from mercury cell process in chlorine production
2869	Liquid waste from washing and stripping in production of malathion
2911	Petroleum refining-stop oil emulsion solids
3691	Nickel cadmium battery production wastewater treatment solids

Figure 1. Examples of SIC listing.

CHIL

CHIL is a Navy publication* which lists hazardous items by name, type of hazard, size, National Stock Number (NSN), and disposal technique. Although not all of the items on this list fall into the hazardous categories as defined by the EPA, it is a very useful document in that it draws together a large list of hazardous materials, sorts them into categories, and assigns them numbers which can be searched for by NSNs. CHIL also identifies materials which are *potential* hazardous wastes.

HMIS

HMIS, a computerized information system being developed by the Defense Logistics Agency, catalogs all DOD hazardous items and gives information regarding the type and degree of hazard the material constitutes. As part of its system, HMIS incorporates CHIL. The system can be addressed by NSN, National Institute of Safety and Health number, and in several other ways to obtain information about a particular material. At the time of this writing, HMIS is not yet on-line and fully operational, but when it is, it should also be a good indicator of potentially hazardous waste materials.⁵

Industrial Health Hazards Inventory (IHHI)

The IHHI is a survey conducted by AEHA to assess on-the-job dangers at military installations. The survey is wide-reaching, and not all aspects apply to hazardous wastes/materials. However, it is a very useful tool for locating potentially hazardous waste. If one has been conducted at the installation, it should be available through the Preventive Medicine (PM) Branch.

EPA Hazardous Materials Information

The EPA publishes many articles about hazardous waste and should be considered a prime source of information on the subject. Although EPA publications are not generally useful as direct survey tools, they give good background on the hazards involved with certain types of

⁵ Personal communication between D. Kraybill of CERL and D. Appler of the Defense Logistics Agency, March 1979.
 * NAVSVP Publication 4500; COG/Stock NA588-00-005-000.

wastes and could conceivably be good guides to working safely around these materials. They also provide good basic knowledge for public relations work. Potentially useful EPA and other government publications are listed in Appendix A.

3 SURVEY FORMAT

Planning the Survey

The most important step in conducting a hazardous waste survey at any military installation is to assign the survey responsibility to a competent individual, i.e., the installation's Environmental Officer (EO). The EO should have contact with the operations which generate hazardous waste, and a staff which is already somewhat knowledgeable about hazardous wastes.

In laying out plans for the original survey, it is necessary to establish a system of where and how to look for hazardous waste and materials. This search can be conducted in two phases: (1) A search of the records of various organizations and commands on the installation, and (2) a physical search of shops, storage areas, etc., to determine the types of materials produced.

The records search requires the cooperation of people in the bookkeeping areas of each installation organization. Materials are searched for by looking for NSNs or actual product names (as per the CHIL list)* or simply by identifying items which would obviously be considered hazardous wastes as defined by the EPA.

As might be imagined, record searching is an extremely arduous task if done manually. It is suited to computer search methods; however, many installation records and computer files are difficult to adapt to automated hazardous waste searches.

At the same time the installation record search is performed, an actual physical search of the installation should be conducted to identify the types of hazardous waste and material typically generated, their present mode of storage, and current disposal practices. However, before a physical search is begun, a "firstcut" should be made of the general locations where various types of hazardous waste are most likely to be found. To make this "firstcut," a series of "think sessions" with people involved in the hazardous waste survey should be held. Many hazardous waste locations (e.g., vehicle rebuilding operations) can be expected to harbor more than one type of potentially hazardous material. Since even a general listing of possible locations can become very large, a generalized matrix for locating some of the more typical hazardous wastes is given in Table 2. This matrix is by no means complete and should not be the limiting factor in establishing locations for a hazardous waste search.

Search Format

The individual(s) who make the actual physical search for hazardous waste must know what constitutes a hazardous waste and have an eye for potentially hazardous waste problems. Therefore, the surveyor must educate himself** by reading and absorbing as much technical matter on the subject as possible. It is also important that he familiarize himself with the Federal stock system and be able to recognize the NSNs of potentially hazardous waste. (Appendix A lists some of the publications the surveyor can use to obtain background information for a hazardous waste search.)

The surveyor must work closely with installation officials when conducting a survey. This will prevent conflicts which could result from a misunderstanding of the purpose of the survey and give the surveyor easier access to lists and charts of data pertaining to the hazardous materials (e.g., petroleum oil lubricant [POL] and entomology stock lists). Because the survey is a cooperative effort of the surveyor and installation officials, the surveyor should not visit shops without first clearing the visit with the appropriate supervisors.

The surveyor should prepare a worksheet listing the potential sources of hazardous wastes and their locations and mark off these places as they are visited. This is a seemingly simple process, but will help the surveyor immensely, since the list of places to search can become long very quickly.

* Note: Many types of paints and paint wastes are not listed in CHIL.

**The male pronoun is used throughout this report to refer to both genders.

Table 2
Waste Matrix

	Vehicle		Motor Troop		Sanitary		Entomology		Packing Shop		Paint Shops & Clinics		Heating & Cooling Plant		Fire Dept.		Aviation Maintenance		Industrial Waste Treatment Plant		Sewage Treatment Plant		Laundry Facilities		POL Yard	
	Vehicle Repairing Facility	Vehicle Maintenance Facility	Motor Troop Units	Troop Units	Sanitary Landfill	Sanitary Landfill	Shop	Shop	Shop	Shop	Hospitals	Hospitals	Plant	Plant	Dept.	Dept.	Plant	Plant	Plant	Plant	Plant	Plant	Plant	Plant	Plant	Plant
Solvents	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Lubricating oil	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Hydraulic & cutting oil	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Paint waste	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Solvent tank bottoms	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Toluene diisocyanate	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Leachate from hazardous waste landfill	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Electroplating sludge	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Insecticides, pesticides, etc.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Hospital-type waste	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Decontaminating agents	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Miscellaneous chemicals	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
POL-contaminated soil	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Where to search depends largely on the nature and size of the installation. For example, if the installation does not have a Directorate of Industrial Operations (DIO), it will be necessary to search out industrial operations individually. A sample worksheet is shown in Figure 2.

The surveyor must also interview nonsupervisory civilian and military personnel, since field workers can give the surveyor information on actual, day-to-day operations that a supervisor may not be able to provide (e.g., "We usually just dump it over there").

A general format for an installation hazardous waste search is given in Table 3.

Table 3
Search Format

- I. Collect Background Information
 - A. Army Literature
 1. Current disposal practices for hazardous/toxic materials
 2. Familiarization with Federal stock system
 - B. EPA Literature
 1. The Resource Recovery Act, the Toxic Substances Control Act, EPA-proposed hazardous waste regulations
 2. Other EPA Technical Literature
 - C. State Regulations
 - D. Other (any available technical literature, e.g., textbook and professional publications)
- II. Pre-Survey Organization
 - A. List of likely waste locations
 1. Motor pools
 2. Mechanical shops
 3. Vehicle or machine rebuilding operations
 4. Machine shops
 5. Property Disposal Office (PDO)
 6. Mechanically oriented craft shops
 7. Electronics shops (interior and exterior electrical)
 8. Paint shops
 9. Vehicle refueling stations (Class III--POL)
 10. Hospitals, infirmaries, clinics
 11. Veterinary facilities
 12. Entomology lab
 13. Other sources that will be unique to each installation
 - B. Meet with installation officials
 1. Commanding Officer (CO)
 2. Facility Engineer (FE)
 3. Environmental Officer (EO)
 4. PDO
 5. Directorate of Industrial Operations (DIO)
 6. G4 Maintenance
 7. Post Exchange (PX)
 8. Entomology shop
 9. Command chemical
 10. Others (as needed)
 11. Post Surgeon
- III. Conduct Survey
 - A. Establish Worksheet (list all sites to be visited)
 - B. Prepare for Site Visits
 1. Visit site supervisors
 2. Examine stock records
 - C. Site visit
 1. Examine stock rooms and storage methods
 2. Examine work and disposal practices
 3. List type, amount, and location of hazardous waste surveyed
 4. Describe general condition of hazardous waste and storage facilities

Installation	Bldg/Bay No.	Directorate/ Div.	Operator	Date of Visit
Commissary	1525	Midwest Comm. Field Office		
Vet. Clinic	6001	--		
Free Turn In	226	--		
Warehouse	237	--		
Main Exchange	1510	Area exchange		
Military Rent-all	1827	AFFGS		
Craft Center	2200	Rec. Suc.		
A Co. 704 Maintenance	1003	Division	Electronics Shop	
B Co. 704 Maintenance	1002	Division	Vehicle Maintenance	
C Co. 704 Maintenance	1001	Division	Vehicle Maintenance	
D Co. 704 Maintenance	1104	Division	Vehicle Maintenance	
E Co. 704 Maintenance	1105	Division	Vehicle Maintenance	

Waste Information

1. Installation:
2. Waste name:
3. Scientific name:
4. Location:
5. Quantity:
6. Generator:
7. Physical description:
8. Type of hazard:
9. Safety precautions:
10. Current disposal practices:
11. Procurement number:
12. SIC code:
13. Controlling unit, officer, responsible person, etc.:
14. Shipping methods:
15. Other identification:

Figure 2. Sample worksheet.

4 INSTALLATION A -- SURVEY DESCRIPTION

Description of Meetings

Installation A is a FORSCOM operation which maintains large numbers of tactical vehicles. It also has several industrial operations. Installation A has a population profile of 37,328.

Before Installation A's survey was begun, a coordination meeting was held with officials of the various activities within the installations that were potential hazardous waste producers. Representatives from the following offices/commands were invited:

1. Commanding Officer (CO) -- The presence of a representative of the CO is necessary, so the CO will be well informed as to the activities of the survey party. Nurturing a good relationship with the CO can help immensely if cooperation problems arise.
2. FE -- The FE is the supervisor of many shops on the installation which are a potential source of hazardous waste (e.g., paint shop and electrical shop).
3. Environmental Office -- The environmental office should have knowledge of hazardous waste and may have already done some preliminary survey-type work.
4. Property Disposal Office (PDO) -- This office handles the disposal of Army properties which are no longer needed, but which may still have some value. Among these properties could be many hazardous wastes and materials.
5. DIO -- At Installation A, the DIO was in charge of several industrial activities which generated hazardous waste.
6. G-4 Maintenance Division -- This office is responsible for general maintenance of military vehicles. As a result, it can be considered a prime source of many hazardous wastes (e.g., waste motor oil).
7. Post Exchange (PX) -- The PX stocks many items which are considered hazardous. Although these materials are sold throughout the installation and are impossible to track down, PX stock records can provide a valuable listing of potentially hazardous wastes. The PX also controls the installation's service stations, another potential source of hazardous waste.
8. Entomology Shop -- The entomology shop was included as a special case at Installation A, since it handled all the insecticides, pesticides, etc., that are used on the installation. In general, an entomology shop can provide information on chemical stocks and disposal practices.
9. Procurement and Supply -- Procurement and Supply maintains information on all material purchased for the installation. These records can be used to indicate amounts of materials that have the potential for becoming hazardous waste because of contamination, becoming outdated, or as a result of being used in a manufacturing process.

The purpose and possible effects of the survey were explained at Installation A's coordination meeting, and input and ideas were requested from those present. It was emphasized that the survey activities were **not** intended to result in punitive actions against any organization.

After the coordination meeting, subsequent individual meetings were held with officials after they had been given time to assemble as much information as possible about their organization's production of hazardous waste. By giving these officials time to assemble information about the sorts of hazardous waste their organization handles and/or generates, much of the paper work was already done by the time the survey team arrived at a shop, thus allowing the team to go directly onto the physical inspection tours.

Physical Search

Procurement and Supply

Installation A's procurement and supply office could not give the survey team much useful information, since its computer files were not formatted in a way that could be used in a hazardous waste search. In light of this and the limited timeframe in which the survey team was working, it was decided to restrict the survey to physical searching of the installation and obtaining information from individual commands and offices.

Company Level Hazardous Waste/Material

To get an idea of what goes on at the company level, it was decided to conduct a walk-through of an infantry company. The company selected had 180 military personnel and maintained 25 vehicles, mostly armored personnel carriers (APCs).

Three specific sections of this company's activities involved generation of hazardous waste or handling of hazardous materials:

1. The Chemical, Biological, and Radiological (CBR) Unit uses two decontaminating agents which are hazardous -- DS-2 and Super Tropical Bleach (STB). When these materials are dumped at landfills or any non-approved site, this is considered illegal dumping.

2. The Field Sanitation Unit, which handles noncombat supplies for personal health, uses several types of insecticides, rodenticides, and repellents (Table 4).

3. The company maintenance activity, which consists mostly of oil and antifreeze changes, cleaning, and minor repairs, drained used motor oil into an underground tank (1000 gal [3780 L]); the oil was collected periodically by a civilian contractor. There is definite evidence of spilled oil and resultant ground contamination. The company also kept several materials on hand for vehicle maintenance (Table 5).

Most of the materials from the CBR and Field Sanitation were stored either in unsecured areas inside the company building, or outside in cabinets which had been laid on their backs. The outside cabinets contain cans of DS-2, which is a powerful corrosive, and large amounts of several insecticides.

In general, the most potentially hazardous situations this company seemed to have were lack of secure storage for decontaminating agents, the presence of rather large quantities of a powerful insecticide, and poor practices during oil changes on vehicles, resulting in oil contamination of the soil.

Table 4

Field Sanitation Unit Personal Health Supplies

Name	FSN/NSN	Description
Insecticide (Pyrethrin)	6840-823-7849	Eight cases of spray cans
Rodenticide bait anticoagulant (Fumarin)	6840-753-4973	Five 5-lb (2-kg) cans
Insecticide (Lindane)	6840-242-4217	
Insecticide (Diazanone)	6840-00-844-7355	Ten 1-gal (4.28-L) cans
DS-2	--	One 5-gal (21.4-L) can

Table 5
Company Vehicle Maintenance Supplies -- Installation A

Name	Quantity*
Antifreeze	Three 55-gal (235.4-L) drums
Motor oil	Twenty 55-gal (235.4-L) drums

*Including many small cans of motor oil and various other types of fluids.

Entomology Shop

The entomology shop at Installation A handles general pest control for the entire installation. It has in stock large quantities of many types of insecticides, pesticides, and herbicides. Many of the materials stored in the entomology shop's sheds are banned or cancelled pesticides (e.g., DDT and 2, 4, 5-T).

Large quantities of DDT-bearing materials were also present. These materials are currently being repackaged and stored in unmarked crates in an unsecured area.

According to the shop's foreman, it is fairly common for troop units to dispose of pesticides and pesticide containers in general refuse.

The foreman seemed to be well educated in safety matters relating to use and disposal of the hazardous materials kept in the entomology shop. Very complete records are kept; a copy of the current supplies on hand at Installation A is listed in Appendix B. In all, this seems to be a good operation. The only potentially hazardous situation is the containers of DDT, which could easily be mistaken for something else.

Medical Facilities

Hospitals, clinics, and veterinary facilities produce generally small amounts of several types of waste which are hazardous in various ways.

Pathological wastes that present a biological hazard are produced at Installation A at the rate of 12 lb/day (5.45 kg/day). These include tissue samples, plate counts, post mortem wastes, etc. These materials are currently burned in a special incinerator.

The hospital also produces about 500 lb/day (227.3 kg/day) of infectious waste. These items include such things as wound dressings, nonreusable bedware from diseased patients, and generally anything which has come in contact with a patient who has a communicable disease.

Pathological and infectious wastes are currently placed in red plastic bags (to signify their danger), and sent to the installation's landfill.

Live vaccines are disposed of in small quantities by autoclaving and landfilling.

Hospital pathology wastes are generated at the rate of 105 gal/day (397 L/day). These include tissue wastes, samples, leftover plasma, etc. These wastes are currently autoclaved, placed in double-lined yellow bags (to denote their hazard), and landfilled.

Silver from hospital photographic labs and from other photo labs on the installation is generated at the rate of 30 g/week. Silver is currently recovered from the process solution and given to the PDO for resale.

Expired drugs are currently either landfilled or flushed into the sewer. The generation rate is 252 gal/month (953 L/month).

Expired controlled drugs are disposed of according to AR 40-2, Chapter 7.⁶ They are generated at a rate of 2 g/month.

The hospital system at Installation A keeps very good track of anything it disposes of that might be a health hazard. The Preventive Medicine Branch is the authority currently responsible for most of these activities. The only activities impacted by the EPA-proposed regulations are the disposal of drugs and infectious waste (red bags), although it is not clear whether some of these materials really fit into the EPA categories.

Radioactive Waste

Installation A generates about 200 lb/year (756 L/year) of radioactive waste. The solid portion of this waste is held until its half-life has expired and then landfilled. There are very specific regulations which cover these materials that are beyond the scope of this report. However, it should be noted that each material must be handled differently. A list of some of the radioactive materials encountered at Installation A is in Table 6.

PDO

A well-run and cooperative PDO can be very helpful in a hazardous waste survey. The PDO at Installation A had two publications which listed hazardous wastes/materials: the General Inventory List named all Army properties for which the PDO was accountable; the Integrated Disposal Management System (IDMS) Hazardous Property Notification List, cataloged hazardous materials according to the *Defense Property Disposal Services IDMS Codes and Terms Pocket Reference*, which lists about 125 different hazard codes.⁷ Some parts of this listing are applicable to the EPA-proposed regulation.

Not all items shown on the PDO list were physically located in PDO areas, since the PDO will not accept all the materials for storage in its areas (e.g., the DDT in the entomology shop is for sale and shows up on the PDO listing, but the PDO does not store it in a PDO area). The location of non-PDO stored items is shown on the PDO's Hazardous Property List. Also listed is a determination of whether PDO will accept more of each property. A sample of this list is shown in Table 7. It is worth noting that if this list is kept up to date and the PDO is cooperative, many problems can be solved and much of the legwork of the survey team can be eliminated.

The PDO at Installation A also handled the contract for the civilian oil reprocessor that services the post.

Table 6

Radioactive Materials at Installation A

Colbalt-60
H3-tritium
Radium-226
Strontium-90
Yttrium-90
Iodine-125
Cesium-137
Thorium-232
Nickel-63
Uranium-238
Plutonium-239
Polonium-210

⁶ *Army Medical Treatment Facilities: General Administration*, Army Regulation (AR) 40-2, 42A paren 2 (Department of the Army, 30 March 1978).

⁷ *Defense Property Disposal Services IDMS Codes and Terms Pocket Reference* (Defense Property Disposal Service, 1976).

Table 7

IDMS Hazardous Property Notification List

USABLE PROPERTY

NSN	TID	Noun Name	Hazd Code	Cargo Code	IDMS CODED	GSA Cond	Site	Sci/ Location	UT	Qty O/H	First Time Rctt	Do Not Accept	First Time Code
6665 00 5431443	FE305982150230	Hadlac Set	GC	A		XX	AO	LM660006A	EA	3		*	
6665 00 5431443	FE305982300336	Radial Set	GC	A		XX	AO	LM660006A	EA	1		*	
6750 00 6807877	FB700011800133	Chemical Kit, Photog	AX	H		N2	AO	LS675028B	KT	6			
6810 00 1746604	FB250091100457	Anti Acetate, Techni	BA	R		N3	A*	01C07A01	PT	5	*		
6810 00 2229665	FB250082200546	Potassium Permangan	EF	Y		N2	A*	LS684014A	LP	19			
6810 00 2382119	FB250090850320	Naphtha, Aliphatic	BN	R		N1	A*	01A003401	GL	6			
6810 00 2463785	FB250090480004	Methyl Isobutyl Ket	BN	R		N1	A*	01C7A1000	GL	35			
6810 00 8551158	FB250090450390A	Isopropyl Alcohol, Y	BN	R		N1	AO	NO70201A1	DP	2			
6810 00 8551158	FB250090450390	Isopropyl Alcohol, T	BN	R		N2	AO	NO70201A1	GL	15			
6810 00 8551158	FB250090920023	Isopropyl Alcohol, T	BN	R		N1	A*	01E908A09	CM	9			
6840 00 2432940	SZ403863450372	Insecticide, DDT	CG	S		N2	A*	212000000	EA	3	Dusting Powder 5-lb cans of 10% DDT		
6840 00 2432940	SZ403863450371	Insecticide, DDT	CG	S		N2	A*	212000000	EA	35	Dusting Powder 5-lb cans of 10% DDT		
6840 00 2424219	FB700062329995	Insecticide, Lindane	CG	S		N2	A*	AFAUWSEN	CM	2		*	
6840 00 2424219	FB700052810012	Insecticide, DDT	CG	S		N2	A*	AFAUWSEN	CM	6		*	
6840 00 2424219	W31RE60750019	Insecticide, DDT	CG	S		N2	A*	INSIDE 212	CM	1		*	
6840 00 2533892	FB700062329993	Insecticide, DDT	CG	S		N2	A*	AFAUWSEN	CM	1		*	
6840 00 2533892	W31RE60750015	Insecticide, DDT	CG	S		XX	A*	INSIDE 212	CM	1		*	
6840 00 2533892	W31RE60750015	Insecticide, DDT	CG	S		O2	A*	INSIDE 212	DR	1		*	
6840 00 2533892	W31RE60750016	Insecticide, DDT	CG	S		N1	A*	INSIDE 212	DR	4		*	
6840 00 2533892	W31RE60750017	Insecticide, DDT	CG	S		XX	A*	INSIDE 212	DR	1		*	
6840 00 2533892	W31RE60750018A	Insecticide, DDT	CG	S		N2	A*	INSIDE 212	CM	2		*	
6840 00 2533892	W31RE60750018B	Insecticide, DDT	CG	S		N2	A*	INSIDE 212	CM	4		*	
6840 00 2533892	W31RE60750018B	Insecticide, DDT	CG	S		N1	A*	INSIDE 212	CM	2		*	
6840 00 5407825	FB2500630290056	Insecticide, DDT	CG	S		N1	A*	01C009A01	CM	12		*	
6840 00 5765008	FB700062329994	Insecticide, DDT	CG	S		N2	A*	AFAUWSEN	DR	3		*	
6840 00 5947314	FB700062329992	Insecticide, DDT	CG	S		N2	A*	AFAUWSEN	DR	1		*	
6850 00 5626315	FB2500902060328	Inspection Penetrant	EG	G		N1	AO	LS680014A	CM	57			
6850 00 7472700	FB700090300302	Cleaning Compounds	AX	U		N4	AO	NO70101A1	CM	60			
6850 00 5431248	FB250090460000	Deicing-Defrosting	FF	R		N3	AO	0010952A1	DR	1			
6850 00 8254753	FB250090820223	Cleaning Compound, A	AX	M		N1	A*	01C7A0010	CH	14			
7360 00 0F22153	W51HK091084005	Range Outfit, Field	EG	G		R4	AO	0021318A1	EA	1			
8010 00 2972136	FB250090960408	Paint, Oil	BN	R		N1	AO	NO70202A1	CM	2	*		
8010 00 5965730	FB250090190317	Paint, Rubber	BN	R		N4	AO	0010440A1	CM	4			
8010 00 6645678	FB250090260295	Enamel	BN	R		N1	AO	NO70202A1	GL	29	*		
8010 00 9002936	FB25009060407	Paint, Traffic	BN	R		N1	AO	NO70202A1	CM	2	*		
8010 00 9002938	J900PA83400001	Paint, Traffic	BN	R		N4	AO	NO7006HND	CH	460			
8010 00 9002938	J900PA90530001	Paint, Traffic	BN	R		N4	AO	NO7006HND	CH	154			
8010 00 9003648	J900PA83400002	Paint, Traffic	BN	R		N4	AO	NO7006HND	CM	277			
8010 00 9003648	J900PA83400002	Paint, Traffic	BN	R		N1	AO	NO70202A1	CM	5			
8040 00 1656371	FB250090120012	Adhesive	BN	R		XX	AO	0011204B1	KT	71			
8040 00 2738705	FB250090960303	Adhesive	BN	R		N1	AO	NO70202A1	GI	10	*		
8040 00 2738705	W51G2882705498	Adhesive	BN	R		N1	AO	0011451A1	QT	27			
8040 00 5824597	FB250083350251	Adhesive	BN	R		N4	AO	0011925A1	CM	6			
8040 00 6560929	FB250090960336	Adhesive	BN	R		N1	AO	NO70202A1	GL	12	*		

Table 7 (Cont'd)

NSN	TID	Noun Name	Hazd Code	Cargo Code	TDMS CODED	GSA Cond	Site	Sci/ Location	UT	Qty O/H	First Time Rcft	Do Not Accept	First Time Code
8040 00 6560929	F8700090170414	Adhesive	BN	R		N1	AO	N070202A1	GL	35			
8120 00 2479614	FE250091090565	Cylinder, Compressed	FF	G		R3	AO	D021105A1	EA	2	*		
8120 00 2479614	W51HUR90880728	Cylinder, Compressed	FF	G		R4	AO	N070101A1	EA	1	*		
8120 00 2480174	W51HUR90880727	Cylinder, Compressed	FF	G		R4	AO	N070101A1	EA	3	*		
8120 00 2681357	FE250090860261	Cylinder, Compressed	FF	G		D4	AO	D021036A1	EA	1	*		
9150 00 1858867	W31HPV91070800	Lubricating Oil, Eng	BN	R		N2	AO	D020130A1	DR	14			
9150 00 2319263	F8250090650355	Lubricating Oil, Gen	BN	R		N2	AO	D011634A1	CN	1786			
9150 00 2515440	F8250590990122	Lubricating Oil, Gen	BN	R		N2	AO	D021020A1	CN	1	*		
6810 00 2010904	F8461391130423	Alcohol, Denatured	BN	R		XX	CO	B010229A1	DR	3	*		
6840 00 2466432	W5DK5161471003	Insecticide, DDT	CG	S		D3	C*	39C1	CN	36		*	
6840 00 2613462	S2304861700002		CG	S		N4	D*	0220003A1	DR	4		*	
6840 00 2613462	W51G2F90377721		CG	S		N2	D*	RHAB10616	DR	18		*	
6135 00 8760098	A51AXA81390001	Battery, Wet, Primary	AX	M		XX	PD	A01050001	EA	34			
6135 00 8760098	A51AXA82000001	Battery, Wet, Primary	AX	M		XX	PD	790500001	EA	30			
6135 00 8760098	A51AXA90400011	Battery, Wet, Primary	AX	M		XX	PD	A02002002	EA	88			
6135 00 8760098	W51SGV8079G001	Battery, Wet, Primary	AX	M		XX	PD	A01050001	EA	92			
6810 00 1746581	W51G2B90855051	Sodium Hydroxide, TE	AX	M		N4	PD	41100202A	DR	3			
6810 00 2365663	W51G2B882705442	Hydrochloric Acid, T	AX	M		N2	P*	41100203A	DR	60			
6810 00 2372954	W51G2B90855054	Nitric Acid, ACS	AX	M		N4	PG	41100202A	BT	7			
6810 00 2426336	W51G2B90855055	Sodium Cyanide, Tech	C1	P		N4	PG	41100202A	DR	1			
6810 00 4261864	W51G2B882705443	Hydrochloric Acid, T	AX	M		N2	P*	41100203A	DR	2			
6810 00 5515231	W51G2B90855058	Sulfuric Acid, Elect	AX	M		4	PD	41100202A	CN	5			
6840 00 2533892	AP2A3090510101A		CG	G		N1	P*	BL0863000	CN	2		*	

Usable items in inventory

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Class III Yard

The Class III yard provides bulk storage for gasoline, diesel fuel, oil products, and various other products which require safe and secure storage (e.g., bulk quantities of DS-2, STB, insecticides to be issued to troops, and several types of lab chemicals).

The Class III yard visited at Installation A had two hazardous waste problems. The first was soil contamination caused by leaking oil barrels and oil products. The second, more serious problem was caused by heavy spillage of diesel fuel during loading of bulk delivery trucks; the survey team observed an area about 50 x 50 ft (2500 sq ft) where the ground had been entirely saturated with diesel fuel and there was standing fuel on the ground. The spillage problem seemed to be caused by two factors:

1. A high-capacity pump was used to fill the tanks quickly. Personnel filling the tanks would leave for a short break, not realizing that the tanks would fill so quickly, and would return to find fuel spouting from the tank.

2. There was no automatic shutoff on the pumping system, such as those used at commercial service stations. Thus, an unattended pumping operation could spill an indeterminate amount of fuel until it was manually shut off.

The soil contamination problem stemmed from an unfamiliarity with the properties and handling requirements of some of the materials used in the yard. Personnel seemed unsure of how to handle some of the yard's insecticides and corrosive materials should a spill occur. For example, some were unaware that 12 gal (45.4 L) of Diazanone (a powerful insecticide) that was stored so it was exposed to the weather is potentially very dangerous.

At present, POL-contaminated soils are disposed of in the landfill. This practice may be impacted by the EPA-proposed regulations.

A partial list of the materials found in Class III yards is given in Appendix E.

DIO

The DIO is in charge of most industrial operations at Installation A. The DIO at Installation A is a very large building (about 30 acres [12.1 hectares]). Any repair of a vehicle other than standard maintenance is handled in this building. The DIO also handles battery maintenance, painting, canvas repair, furniture repairs, the oil testing laboratory, etc. An extensive waste oil recycling system has been set up in the building as well as a system for recycling engine solvents. Overall, the facility seems to take very good care of its hazardous waste. A list of the chemicals found in Installation A's DIO is in Appendix C.

Installation A's most severe DIO problem is the disposal of sludges from the vapor degreaser in the engine rebuilding shop. The vapor degreaser is used to clean engine parts before reassembly by immersing them in vaporized trichloroethane, an extremely toxic compound. The sludge generated during this operation is a hazardous waste material.

The survey team was told that about four 55-gal drums of sludge are removed and landfilled every 3 to 4 months during periodic cleaning. This sludge is heavy in trichloroethane (i.e., still liquid in nature). Disposal of this material in a general landfill would be prohibited by the EPA-proposed regulations.

Another problem noted during the survey was the disposal of hazardous paint waste. Several paint booths operate in the building and must be cleaned periodically. Some of the cleaning material and paint waste material is flushed down the drain and into the storm sewer. Empty paint cans and scrapings from the cleaning operation are placed in a general refuse bin and taken to the landfill. This practice would also be prohibited by the EPA-proposed regulations.

The third problem may or may not be serious, but deserves some investigation. Floor sweepings from the entire building are handled by a mechanical sweeping vehicle. The sweepings, which come from all shop areas, including machine shops, paint shops, and many other sources, are put into general refuse. These sweepings could contain significant amounts of heavy metals, paint sludges, waste oil, etc.

Maintenance Battalions

A maintenance battalion at Installation A was surveyed to determine what kinds of hazardous wastes are generated by its activities. The maintenance battalion basically does work which is too complex for general troop units to do, but not severe enough to be sent to the installation-wide repair facility (e.g., minor brake maintenance and pulling of engines to be sent to the DIO). The maintenance battalion's biggest potentially hazardous waste problem was poor handling of waste oil. Facilities for proper handling of waste oil were not well designed; storage consisted of old fuel pods placed outside the building, in such a location that they were very difficult to reach by an individual handling a 5- or 10-gal pail of oil. More often than not, the oil would be spilled on the ground (Figure 3).

Oil from engine washing was also a potentially hazardous waste problem. The water/oil mixture from the washing operation went directly into the storm sewer; it was unclear whether or not the sewer was equipped with any kind of oil removal trap or discharge line (Figure 4). The survey team also observed oil from a recently pulled engine draining directly into a storm drain. Oil absorbent used to soak up oil spills generally went into the dumpster. The removal of the oil-contaminated soil in this area could be a problem if the EPA-proposed regulations prohibit it from being landfilled.

It should also be noted that cans and pails of such materials as grease and various types of solvents are supposed to be disposed of in a metals recycling bin. In practice, however, they often end up in a dumpster. Thus, the metal is lost and the leftover materials in the cans are landfilled -- a potential pollution problem.

Heating and Cooling Plants

Chemicals present in heating and cooling plants are basically divided into three categories: (1) chemicals used in boiler feed waters to adjust pH, prevent scaling or corrosion, or to clean the interior of the boiler, (2) chemicals used in the testing of the feed water, and (3) boiler blowdown liquid. The chemicals found at the heating and cooling plants at Installation A are listed in Table 8. The containers for most of these chemicals, bags, and cans are generally disposed of in a dumpster.

Directorate of Facilities Engineering (DFAE) Paint Shop

The DFAE paint shop at Installation A is responsible for much of the installation's general painting, including painting of buildings, preparing signs, etc. As a result, the shop keeps a rather large inventory of paints, thinners, and general painting supplies. Two hazardous waste problems were noted at this shop.

Table 8

Heating and Cooling Plant Chemicals -- Installation A

Material	Hazard	Quantity
Cyclohexylamine	Combustible	120 lb (36 kg)
Caustic soda	Corrosive	600 lb (182 kg)
Caustic potash	Corrosive	Exact quantity unknown, but present in large amounts
Hydrochloric acid	Corrosive	Present only in small amounts, i.e., laboratory quantities



Figure 3. Oil recycling at Installation A.



Figure 4. Water/oil mixture draining into sewer -- Installation A.

First, as with many previously mentioned shops, the old paint cans are disposed of in general refuse. This is also true of old rags, slops, and brushes. This practice would be prohibited if the EPA-proposed regulations are passed.

Second, and more severe, is the practice of dumping old paint and paint products into a ditch behind the building. The ditch is extremely polluted and could cause severe environmental impact.

DFAE Electric Shop

At Installation A, the electrical shop handles general electrical maintenance installation-wide, including light bulb replacement, wiring repair, etc. The main concern here was with transformers which might contain PCB. Although several small transformers were sitting around, shop personnel seemed unsure as to whether they contained PCB. This indicates that electrical shop personnel are generally unaware of the potential environmental and health hazards of the materials they work with.

PX

The PX sells a wide variety of products to military personnel and their families. Inspection of the PX revealed that it sold many powerful pesticides; a partial list of these pesticides is given in Table 9.

The PX is also in charge of the installation's service stations. These are typical service stations that sell gasoline, automotive products, and service vehicles. Their oil is picked up by the same waste oil recycling contractor that services the rest of Installation A.

Installation A Survey -- Summary

The bulk of hazardous waste present at Installation A can be condensed into five categories: (1) waste oil/POL, (2) solvent tank bottom sludges, (3) paint wastes, (4) pesticides and insecticides, and (5) infectious wastes. Waste oil and POL result mostly in soil contamination. Contaminated soil is currently landfilled at Installation A, but if the EPA-proposed regulations are passed, this activity may be severely limited. Most POL/waste oil soil contamination is caused by (1) an apparent lack of knowledge on the part of personnel working with these materials of the environmental damages that these materials can cause, or (2) poorly conceived handling and disposal equipment (e.g., diesel fuel pumps with no automatic shutoff). Better planning and an oil recycling program which is more attuned to the needs of field personnel and line mechanics would alleviate many of these handling and disposal problems; field personnel must also be made aware of the reasons an effective waste oil recycling program is necessary.

Table 9

Pesticides Sold at the PX -- Installation A

Material	Quantity
Ortho-Isotex insect spray	One hundred 1-quart bottles
Ortho-Dyrene lawn disease control	One hundred 1-lb tubes
Ortho-Diazanone (25 percent)	One hundred 1-pint bottles; twenty-five 1-quart bottles
Ortho-Zindane (20 percent)	Fifteen 1-pint bottles
Ortho-Malathion (50 percent)	Thirty 1-pint bottles; twenty 1-quart bottles

The landfilling of solvent and/or degreaser sludges is simply a case of a standard practice which will have to change, since disposal of these materials will soon be restricted to hazardous waste landfills.

Landfill disposal of paint wastes and paint containers is another standard practice which will have to change. The quantities in this case are more significant; however, indiscriminate dumping of paint wastes into open ditches can be limited by educating personnel who work with these materials as to the potential hazard dumping can present to health and the environment.

Pesticides are not presently a problem at Installation A, but they cannot be stored indefinitely.

5 INSTALLATION B -- SURVEY DESCRIPTION

The purpose of visiting Installation B was to verify the hazardous waste survey findings from Installation A. Installation B is also a FORSCOM installation with many mechanized units that require large maintenance operations. Like Installation A, Installation B has many industrial operations. Installation B's population profile is 33,145.

Preliminary Meeting

The preliminary meeting held at Installation B was similar to the one held at Installation A. Representatives of the same organizations were present. Findings from the hazardous waste survey are described below.

PDO

The PDO at Installation B is responsible not only for the main installation, but for the Navy ship yards in the area and several other satellite activities (e.g., a remote firing range). Among the hazardous waste materials it receives are old torpedoes, deactivated artillery shells, and spent shell casings -- basically large amounts of ordnance-type material. Although these materials are categorized as deactivated, live rounds have been and are regularly found.

Another hazardous waste problem at Installation B's PDO is DDT and DDT-contaminated materials. DDT that can no longer be used by the Army is being given to the PDO for safe-keeping and possible resale, i.e., about one hundred 55-gal drums which contain a roughly homogeneous mixture of DDT, diluent water and oils, and old DDT containers. The drums weigh 507 lb (230 kg) each, are relatively new, and show no signs of leakage. They are currently housed in a condemned building in the PDO yard.

Installation B's PDO has a hazardous materials yard (HMY) which contains many materials which could be problems under the EPA-proposed regulations, e.g., ordnance, old batteries, waste POL, and waste paint products. The batteries are stored out-of-doors and are taken by a recycler in batches of 40,000 lb (18 182 kg). The potential exists in the outdoor storage area for ground contamination by acids and heavy metals. Some POL materials, paint, and paint products are kept in storage sheds; however, many containers are left exposed to the weather. There are many leaking containers and ground contamination is evident.

The survey team was told that installation personnel sometimes discard potentially hazardous waste items such as live rounds, waste oil, and PCB-containing materials into general refuse to avoid PDO paperwork.

Installation B's PDO maintains a Hazardous Property Notification List (Table 10). In addition, the guide for the survey team at Installation B prepared a short outline of ideas for finding and quantifying hazardous materials. Its procedures go beyond the scope of this report, but it is included in Appendix D.

Sewage Treatment Plant

A tour of the sewage treatment plant revealed two potential hazardous waste problems. The first was the disposal of expired and contaminated laboratory chemicals used in water and wastewater analysis. The chemicals in Installation B's laboratory seemed well taken care of, but it is something to look for at other installations.

Although the EPA has deferred treating sewage treatment plant sludge as a hazardous waste material, sewage sludge is a potential disposal problem. Sludge at Installation B is currently being used as a soil conditioner at the sanitary landfill to promote grass growth on cover material. However, there is potential for an accumulation of heavy metals and other nondegradable chemicals in the sludge. Installation B's sludge has been analyzed and found not to contain significant quantities of heavy metals, but there is a potential problem should that situation change.

Table 10

PDO Hazardous Property Notification List -- Installation B

USEABLE PROPERTY													
ASN	TID	Item Name	Hazd Code	Cargo Code	TPMS Coded	GSA Cond	Site	Sci/ Location	UT	Qty O/H	First Time Acft	Do Not Accept	First Time Code
4210 00 1519778	N0040690320R28	Cylinder, Compressed	FF	G		XX	A0	D041500A0	EA	1			
4220 00 0970825 LS	FB447990270596	Cylinder and Valve	EG	G		XX	A0	D030302A0	EA	1			
4220 00 0975825 LS	FB447991020421	Cylinder and Valve	EG	G		XX	A0	D041500A0	EA	1			
4220 00 5757231 LS	FB637191170120	Cylinder and Valve	EG	G		R4	A0	A020507B0	EA	1			
5610 00 5160056	N0025191003927	Flight Deck Compound	BN	R		XX	A0	D041423A0	GL	325			
5610 00 5191852	N0040690677634	Flight Deck Compound	BN	R		N3	A0	D031418A0	KT	161			
5610 00 5191852	R0336590290316	Flight Deck Compound	BN	R		XX	A0	LM4010044	CN	6			
5610 00 1464793	N00406903531615	Capacitor, Fixed, Pap	GB	P		XX	AG	LM5900059	EA	18			
5610 00 2957658	R0333190376937	Insulating Compound	BN	R		XX	AG	LM4010044	GL	4			
6140 00 2758451	FB637191060462	Battery, Storage	AX	W		N2	O	A04053180	EA	266			
6150 00 2938095	R0336591270312	Isopropyl Alcohol, M	BN	R		XX	A0	D041622A0	GL	20			
6750 00 6193946	R0462981800346	Fixing Bath, Photogr	AX	W		N2	A0	A030405A0	KT	43			
6750 00 6872659	LMNEV091112112		AX	W		N2	A0	A010652C0	KT	3			
6810 00 0064235	W68EV90762301	Ethylene Glycol, Tec	BN	U		XX	A0	D041671A0	GL	78			
6810 00 2056286	N0040690581603	Alcohol, Denatured	BN	R		N3	A0	D041669A0	QT	2			
6810 00 2032739	R0336590681013	Acetone, Technical	BN	R		XX	A0	LS6850010	CN	11			
6810 00 2050564	R0336590290332	Naphtha, Aliphatic	BN	R		XX	A0	LS6850010	CN	2			
6810 00 2611364	N0040690580001	Acetone, Technical	BN	R		XX	A0	LS6850010	DR	34			
6810 00 2612002	R0336590681028	Toluene, Technical	BN	R		XX	A0	LS6850010	CN	2			
6810 00 2612002	SZ338090999002	Toluene, Technical	BN	R		XX	A0	LS6850010	GL	234			
6810 00 2612785	R0336590681006	Methyl Ethyl Ketone	BN	R		XX	A0	LS6850010	CN	1			
6810 00 2619827	SZ338091159010	Potassium Hydroxide	AX	W		XX	A0	D041669A0	LB	6			
6810 00 2622855	R5270090157955	Toluene-Methyl Isob	BN	R		XX	A0	LS6850010	CL	2			
6810 00 5442070	R0336590300374	Sylene, Technical	BN	R		XX	A0	LS6850010	CN	1			
6810 00 5597316	N0040690466990	Sodium Hypochlorite	EF	Y		XX	A0	D041669A0	GL	6			
6840 00 2424222	N0062022703341	Insecticide, DDT	CG	S		N2	A0	A096720A0	LB	139		*	
6840 00 2464432	W68EV90840108	Insecticide, DDT	CG	S		XX	A0	A096720A0	CN	8		*	
6840 00 2533392	N0062022703341	Insecticide, DDT, Liquid	CG	S		N2	A0	A096720A0	GL	7		*	
6840 00 2533892	SZ338060780006	Insecticide, DDT, Liquid	CG	S		N4	A0	967200000	EA	31		*	
6840 00 2533892	SZ338060780003	Insecticide, DDT, Liquid	CG	S		N4	A0	967200000	CN	148		*	
6840 00 2533892	W68EV906050400	Insecticide, DDT, Liquid	CG	S		N2	A0	966928A03	CN	96		*	
6840 00 2533892	W68EV906040107	Insecticide, DDT, Liquid	CG	S		XX	A0	A096720A0	CN	6		*	
6840 00 2646692	N0062022072962	Insecticide, DDT	CG	S		N2	A0	A096720A0	LB	45		*	
6840 00 2646692	W68EV9060840102	Insecticide, DDT	CG	S		XX	A0	A096720A0	EA	12		*	
6840 00 2154337	W68EV9060840103	Insecticide, DDT, Liquid	CG	S		XX	A0	A096720A0	CN	1		*	
6840 00 5430438	N0062022072961	Insecticide, DDT	CG	S		N2	A0	A096720A0	GL	20		*	
6850 00 1429247	R0336590300354	Cleaning Compound, S	EG	G		XX	A0	LS6850010	CN	24			
6850 00 2976653	W68EV9071413046	Decontaminating Age	EF	Y		XX	A0	D041669A0	LB	100			
6850 00 6561292	R0333490460002	Corrosion Removing	AX	W		XX	A0	D041671A0	CN	10			
6850 00 6549067	R0334390366929	Layout Dye	BN	R		XX	A0	LS6850010	PT	10			
6850 00 7646999	R0336591170314	Lithographic Blanke	BN	R		XX	A0	D041669A0	CN	1			
7360 00 0822153	W68EV904404000	Range Outfit, Field	EG	G		XX	A0	A020610C0	EA	3			
7360 00 0822153	W68EV905304000	Range Outfit, Field	EG	G		XX	A0	A030601C0	EA	1			
7360 00 0822153	W68EV908204001	Range Outfit, Field	EG	G		XX	A0	A030444C0	EA	1			

Table 10 (Cont'd)

USABLE PROPERTY													
NSN	TID	Item Name	Hazd Code	Cargo Code	TDMS Coded	GSA Cond	Site	Self Location	UT	Qty O/H	First Time Acft	Do Not Accept	First Time Code
7510 00 1471257	W65HRS00695006	Accessory Outfit, CA	EG	G		R4	AD	AD0033245	1A	1			
7510 00 2724802	RS270070177972	Duplicating Fluid, D	BN	R		XX	AD	158011043	GL	40			
8010 00 0672435	R0333590330480	Lacquer	BN	R		XX	AD	148011044	CN	34			
8010 00 0802450	R0336040300350	Primer Coating	BN	R		XX	AD	152011056	CN	22			
8010 00 1617419	FR417431300336	Primer Coating	BN	R		XX	AD	1641411A3	GL	9			
8010 00 1654764	R033610300365	Primer, Paint	BN	R		XX	AD	153111045	CN	65			
8010 00 1654357	R0333112150322	Primer Coating	BN	R		XX	AD	158011042	CN	2			
8010 00 1697383	R033340465007	Primer Coating	BN	R		XX	AD	158011042	CN	6			
8010 00 2257461	NS43431113163	Enamel	BN	R		XX	AD	164151049	GL	14			
8010 00 2454671	R033340465009	Enamel	BN	R		XX	AD	164151049	CN	20			
8010 00 2454671	R033340465009	Enamel	BN	R		XX	AD	164151049	CN	6			
8010 00 2454671	R033340465009	Enamel	BN	R		XX	AD	164151049	CN	10			
8010 00 2454671	R033340465009	Enamel	BN	R		XX	AD	164151049	GL	8			
8010 00 2454671	R033340465009	Primer Coating	BN	R		N3	AD	164151049	CN	27			
8010 00 2911059	FR417431300336	Paint, Rubber	BN	R		XX	AD	164151049	CN	6			
8010 00 2911059	FR417431300336	Paint, Rubber	BN	R		XX	AD	164151049	CN	6			
8010 00 2911059	FR417431300336	Paint, Rubber	BN	R		XX	AD	164151049	CN	24			
8010 00 2911059	FR417431300336	Paint, Rubber	BN	R		XX	AD	164151049	CN	6			
8010 00 2911059	FR417431300336	Paint, Rubber	BN	R		XX	AD	164151049	CN	6			
8010 00 2911059	FR417431300336	Paint, Rubber	BN	R		XX	AD	164151049	CN	4			
8010 00 2911059	FR417431300336	Paint, Rubber	BN	R		XX	AD	164151049	CN	8			
8010 00 2911059	FR417431300336	Paint, Rubber	BN	R		XX	AD	164151049	VT	136			
8010 00 2911059	FR417431300336	Paint, Rubber	BN	R		XX	AD	164151049	AT	12			
8010 00 2911059	FR417431300336	Paint, Rubber	BN	R		XX	AD	164151049	AT	12			
8010 00 2911059	FR417431300336	Paint, Rubber	BN	R		XX	AD	164151049	AT	13			
8010 00 2911059	FR417431300336	Paint, Rubber	BN	R		XX	AD	164151049	AT	8			
8010 00 2911059	FR417431300336	Paint, Rubber	BN	R		N3	AD	164151049	CN	7			
8010 00 2911059	FR417431300336	Paint, Rubber	BN	R		XX	AD	164151049	CN	26			
8010 00 2911059	FR417431300336	Paint, Rubber	BN	R		N3	AD	164151049	GL	27			
8010 00 2911059	FR417431300336	Paint, Rubber	BN	R		XX	AD	164151049	CN	23			
8010 00 2911059	FR417431300336	Paint, Rubber	BN	R		N3	AD	164151049	GL	8			
8010 00 2911059	FR417431300336	Paint, Rubber	BN	R		XX	AD	164151049	CN	6			
8010 00 2911059	FR417431300336	Paint, Rubber	BN	R		XX	AD	164151049	GL	12			
8010 00 2911059	FR417431300336	Paint, Rubber	BN	R		XX	AD	164151049	GL	7			
8010 00 2911059	FR417431300336	Paint, Rubber	BN	R		XX	AD	164151049	CN	12			
8010 00 2911059	FR417431300336	Paint, Rubber	BN	R		XX	AD	164151049	CN	4			
8010 00 2911059	FR417431300336	Paint, Rubber	BN	R		N3	AD	164151049	GL	14			
8010 00 2911059	FR417431300336	Paint, Rubber	BN	R		XX	AD	164151049	GL	40			
8010 00 2911059	FR417431300336	Paint, Rubber	BN	R		XX	AD	164151049	CN	22			
8010 00 2911059	FR417431300336	Paint, Rubber	BN	R		XX	AD	164151049	CN	24			
8010 00 2911059	FR417431300336	Paint, Rubber	BN	R		XX	AD	164151049	CN	13			
8010 00 2911059	FR417431300336	Paint, Rubber	BN	R		XX	AD	164151049	CN	2			
8010 00 2911059	FR417431300336	Paint, Rubber	BN	R		XX	AD	164151049	CN	25			
8010 00 2911059	FR417431300336	Paint, Rubber	BN	R		XX	AD	164151049	CN	136			
8010 00 2911059	FR417431300336	Paint, Rubber	BN	R		XX	AD	164151049	GL	12			
8010 00 2911059	FR417431300336	Paint, Rubber	BN	R		XX	AD	164151049	GL	21			

Table 10 (Cont'd)

USABLE PROPERTY													
NSN	TID	Noun Name	Hazd Code	Cargo Code	TDMS Coded	GSA Cond	Site	Sci/ Location	UT	Qty Q/H	First Time Rcft	Do Not Accept	First Time Code
8040 00 2629031	N0040690581598	Adhesive	BN	R		N3	A0	D041519A0	QT	45			
8040 00 2657425	N0025190616766	Adhesive	BN	R		XX	A0	D041526A0	GL	115			
8040 00 2667425	N0376593300357	Adhesive	BN	R		XX	A0	LS9010046	CN	12			
8040 00 2708148	FR417990100184	Adhesive	BN	R		XX	A0	LH8010044	KT	10			
8040 00 2738703	N0040703502012	Adhesive	BN	R		N3	A0	D041527A0	GL	60			
8040 00 2738708	R0457034000042	Adhesive	BN	R		XX	A0	D011545A0	GL	312			
8040 00 2738717	N6340239400546	Adhesive	BN	R		XX	A0	D041419A0	PT	210			
8040 00 5824596	R0334390376939	Adhesive	BN	R		XX	A0	LS9010043	GL	41			
8040 00 5824595	R0376593290301	Adhesive	BN	R		XX	A0	LH8010044	CN	83			
9170 00 2568613	J9008095549091	Turbine Fuel, Aviat	BN	R		XX	A*	A*PCCHORD	GL	500			
9150 00 1113199	R033399470035	Lubricating Oil, Eng	BN	R		XX	A0	LS9150019	CN	7			
9150 00 1899667	W6RLV91273000	Lubricating Oil, Eng	BN	R		XX	A0	D031447A0	DR	1			
9150 00 2319762	U3535582650042	Lubricating Oil, Gen	BN	R		XX	A0	LS9150015	CN	9			
9150 00 2349761	R0334390366911	Lubricating Oil, Ste	BN	R		XX	A0	LS9150017	CN	10			
9150 00 2359761	R0334390366938	Lubricating Oil, Ste	BN	R		XX	A0	LS9150017	CN	12			
9150 00 2359762	R0362961716048A	Lubricating Oil, Ste	BN	R		XX	A0	790141071	CN	188			
9150 00 2359762	N03406872721139	Lubricating Oil, Ste	BN	R		N2	A0	LS9150015	DR	11			
9150 00 2413198	N0310652580778	Lubricating Oil, Com	BN	R		N3	A0	D031528A0	DR	4			
9150 00 4359781	N0040690891402	Lubricating Oil, Gen	BN	R		XX	A0	D031427A0	CN	2			
9150 00 5437630	FR447991170449	Lubricating Oil, Gen	BN	R		XX	A0	D041521A0	LB	140			
9150 00 5774241	R0336590681008	Lubricating Oil, Gen	BN	R		XX	A0	D031544A0	GL	29			
9150 00 5922911	R5270891272383	Lubricating Oil, Ref	BN	R		XX	A0	D041628A0	QT	17			
9150 00 6826771	R0334390366943	Lubricating Oil, Gen	BN	R		XX	A0	LS9150017	CN	7			
9150 00 9429133	R0336590581026	Lubricating Oil, Ste	BN	R		N4	A0	D031532A0	GL	53			
6040 00 2854307	SC040761132669	Insecticide, DDT, Liquid	CG	S		N4	C*	WAWHSE202	CN	501			
6040 00 2854307	SC040861132669B	Insecticide, DDT, Liquid	CG	S		N4	C*	WAWHSE202	DR	56			
4220 00 3417673	FR447991170470	Case, Life Raft	EG	G		XX	00	(H1670078	EA	3			
5970 00 1381452	FR647182250013	Insulating Compound	BN	R		N4	00	LH5900063	CN	1			
8030 00 9357000	FR647190810093	Primer Coating	BN	R		N1	00	A011001A0	KT	8			
8030 00 9357000	FR6462083520331	Sealer	BN	R		N4	00	LS8030045	KT	6			
8040 00 7759403	FR46208040169	Adhesive	BN	R		N4	00	LS8030045	KT	13			
8040 00 8227430	FR647190810091	Adhesive	BN	R		N1	00	A011001A0	QT	22			
8040 00 8227435	FR462082700163	Adhesive	BN	R		N4	00	LS8030045	BT	5			
9150 00 2659417	FR647180930131	Lubricating Oil, Gen	BN	R		N3	00	A010443A0	GL	98			
1335 00 3011692	N0010491280837	Cartridge, Caliber	DC	F		XX	E*	465ARMORY	EA	6			
1330 00 2190557	N0010491290842	Grenade, Hand	DM	J		XX	E*	465ARMORY	EA	1			
1330 00 2630851	H0010491290839	Grenade, Hand	DM	F		XX	E*	465ARMORY	EA	12			
1370 00 1056658	H0010491280833	Signal, Illumination	DM	J		XX	E*	465ARMORY	EA	56			
1370 00 1153432	N0010491280836	Signal, Smoke and Il	DM	J		XX	E*	465ARMORY	EA	14			
1370 00 3095028	N0010491280837	Signal, Smoke and Il	DM	J		XX	E*	465ARMORY	EA	17			
1370 00 3095028	N0010491280835	Signal, Smoke and Il	DM	J		XX	E*	465ARMORY	EA	155			
1370 00 3095028	N0010491290841	Signal, Smoke and Il	DM	J		XX	E*	465ARMORY	EA	17			
1370 00 3095028	N0010493600917	Signal, Smoke and Il	DM	J		XX	E*	465ARMORY	EA	2			
1370 00 5419628	N0010490640986	Signal, Illumination	DM	J		XX	E*	465ARMORY	EA	20			

Table 10 (Cont'd)

USABLE PROPERTY													
NSN	TID	Noun Name	Hazd Code	Cargo Code	TOMS Coded	GSA Cond	Site	Scrl Location	UT	Qty Q/H	First Time Rcft	Do Not Accept	First Time Code
1370 00 6182401	N0010490640984	Signal, Illumination	DH	J		XX	E*	465ARMORY	EA	13		*	
1370 00 6184784	N0010490640985	Signal, Illumination	DH	J		XX	E*	465ARMORY	EA	5		*	
1370 00 7562588	N0010491280839	Signal, Illumination	DH	J		XX	E*	465ARMORY	EA	4		*	
1370 00 9307746	N0010491280828	Signal, Illumination	DH	J		XX	E*	465ARMORY	EA	1		*	
1370 00 9307746	N0010491280834	Signal, Illumination	DH	J		XX	E*	465ARMORY	EA	197		*	
1375 00 9961042	N0010491290840	Firing Device, Demol	AU	F		XX	E*	465ARMORY	EA	1		*	
1377 00 0602855	N0010490730977	Cartridge, Impulse	DC	F		XX	E*	465ARMORY	EA	1		*	
1377 00 0602855	N0010490730977	Cutter, Cartridge AC	EA	F		XX	E*	465ARMORY	EA	1		*	
1377 00 1033434	N0010491152805	Cartridge, Impulse	DC	F		XX	E*	465ARMORY	EA	40		*	
1377 00 1934910	N0010490540907	Cartridge, Impulse	DC	F		XX	E*	465ARMORY	EA	2		*	
1377 00 1934910	N0010490730961	Cartridge, Impulse	DC	F		XX	E*	465ARMORY	EA	4		*	
1377 00 1934910	N0010490900069	Cartridge, Impulse	DC	F		XX	E*	465ARMORY	EA	1		*	
1377 00 1934910	N0010490900073	Cartridge, Impulse	DC	F		XX	E*	465ARMORY	EA	2		*	
1377 00 1934910	N0010490900081	Cartridge, Impulse	DC	F		XX	E*	465ARMORY	EA	1		*	
1377 00 1934910	N0010490900087	Cartridge, Impulse	DC	F		XX	E*	465ARMORY	EA	4		*	
1377 00 1934910	N0010490900092	Cartridge, Impulse	DC	F		XX	E*	465ARMORY	EA	4		*	
1377 00 2938183	N0010490900113	Cartridge, Impulse	DC	F		XX	E*	465ARMORY	EA	3		*	
1377 00 2938184	N0010491152804	Cartridge, Impulse	DC	F		XX	E*	465ARMORY	EA	248		*	
1377 00 4375243	N0010490900053	Initiator, Cartridge	DC	F		XX	E*	465ARMORY	EA	24		*	
1377 00 7070500	N0010490900056	Cartridge, Impulse	DC	F		XX	E*	465ARMORY	EA	1		*	
1377 00 7319272	N0010490900047	Initiator, Cartridge	BG	F		XX	E*	465ARMORY	EA	12		*	
1377 00 7544784	N0010490730962	Cartridge, Impulse	DC	F		XX	E*	465ARMORY	EA	3		*	
1377 00 7544784	N0010490900048	Cartridge, Aircraft	DC	F		XX	E*	465ARMORY	EA	8		*	
1377 00 7544784	N0010490900065	Cartridge, Aircraft	DC	F		XX	E*	465ARMORY	EA	2		*	
1377 00 8455242	N0010490900095	Cartridge Set, Seat	DC	F		XX	E*	465ARMORY	EA	4		*	
1377 00 8455242	N0010490900063	Cartridge Set, Seat	DC	F		XX	E*	465ARMORY	SE	2		*	
1377 00 8455242	N0010490900072	Cartridge Set, Seat	DC	F		XX	E*	465ARMORY	EA	4		*	
1377 00 8455242	N0010490900070	Cartridge Set, Seat	DC	F		XX	E*	465ARMORY	SE	2		*	
1377 00 8455242	N0010490900079	Cartridge Set, Seat	DC	F		XX	E*	465ARMORY	SE	2		*	
1377 00 8455242	N0010490900088	Cartridge Set, Seat	DC	F		XX	E*	465ARMORY	SE	5		*	
1377 00 8455242	N0010490900091	Cartridge Set, Seat	DC	F		XX	E*	465ARMORY	EA	8		*	
1377 00 8455242	N0010490900094	Cartridge Set, Seat	DC	F		XX	E*	465ARMORY	EA	4		*	
1377 00 8838997	N0010490900053	Cartridge, Impulse	DC	F		XX	E*	465ARMORY	EA	7		*	
1377 00 8838997	N0010490900086	Cartridge, Impulse	DC	F		XX	E*	465ARMORY	EA	4		*	
1377 00 8838997	N0010490900082	Cartridge, Impulse	DC	F		XX	E*	465ARMORY	EA	1		*	
1377 00 8838997	N0010490900096	Cartridge, Impulse	DC	F		XX	E*	465ARMORY	EA	4		*	
1377 00 8838998	N0010490540906	Cartridge, Impulse	DC	F		XX	E*	465ARMORY	EA	4		*	
1377 00 8838998	N0010490900051	Cartridge, Impulse	DC	F		XX	E*	465ARMORY	EA	8		*	
1377 00 8838998	N0010490900064	Cartridge, Impulse	DC	F		XX	E*	465ARMORY	EA	2		*	
1377 00 8838998	N0010490900068	Cartridge, Impulse	DC	F		XX	E*	465ARMORY	SE	1		*	
1377 00 8838998	N0010490900075	Cartridge, Impulse	DC	F		XX	E*	465ARMORY	EA	4		*	
1377 00 8838998	N0010490900080	Cartridge, Impulse	DC	F		XX	E*	465ARMORY	SE	2		*	
1377 00 8838998	N0010490900085	Cartridge, Impulse	DC	F		XX	E*	465ARMORY	EA	4		*	
1377 00 8838998	N0010490900095	Cartridge, Impulse	DC	F		XX	E*	465ARMORY	EA	4		*	

Table 10 (Cont'd)

USABLE PROPERTY													
NSN	TID	Noun Name	Hazd Code	Cargo Code	TOMS Coded	GSA Cond	Site	Sci/ Location	UT	Qty O/N	First Time Acft	Do Not Accept	First Time Code
1377 00 9261901	N0010491152806	Initiator, Cartridge	EA	F		XX	E*	465ARMORY	EA	3	*	*	
1377 00 9309390	N0010490540903	Cartridge, Aircraft	DC	F		XX	E*	465ARMORY	EA	8		*	
1377 00 9309390	N0010490930946	Cartridge, Aircraft	DC	F		XX	E*	465ARMORY	EA	20		*	
1377 00 9309390	N0010490790957	Cartridge, Aircraft	DC	F		XX	E*	465ARMORY	EA	24		*	
1377 00 9309390	N0010490990966	Cartridge, Aircraft	DC	F		XX	E*	465ARMORY	EA	4		*	
1377 00 9309390	N0010490990984	Cartridge, Aircraft	DC	F		XX	E*	465ARMORY	EA	4		*	
1377 00 9997463	N0010490990950	Cartridge, Impulse	DC	F		XX	E*	465ARMORY	EA	8		*	
8010 00 1654765	N0062090936930	Shellac, Cut	BN	R		N3	EO	C010101A1	CN	82			
8010 00 7542610	N0062091440149	Primer Coating	BN	R		N3	EO	C010101C1	GL	28			
8040 00 2629010	N0062090090099	Adhesive	BN	R		N3	EO	C010101C2	QT	6			
8040 00 5152746	N0062083602509	Adhesive	BN	R		N3	EO	C010101D1	KT	105			
9150 00 2319063	N0062091441062	Lubricating Oil, Gen	BN	R		N1	EO	C010101E1	CN	114			
9150 00 2575440	N006209016AXG0	Lubricating Oil, Gea	BN	R		N1	EO	C010101A1	CN	24	*		
9150 00 2617895	N006209039A547	Fog Oil	BN	R		N1	EO	C010101A1	DR	1			
5640 00 2671565	N004068342F650	Cloth, Asbestos	GA	N		XX	GO	LM5640026	RD	2		*	
5640 00 2671570	N004068342F651	Cloth, Asbestos	GA	N		XX	GO	LM5640026	RD	2		*	
5640 00 8208046	N004068342F653	Cloth, Asbestos	GA	N		XX	GO	LM5640026	RD	35		*	
5640 00 8222246	N004068342F652	Cloth, Asbestos	GA	N		XX	GO	LM5640026	RD	1		*	
Usable Items in Inventory		194											

Sanitary Landfill

The sanitary landfill at Installation B was a typical landfill, but did receive occasional hazardous wastes from dumpsters.

One section of the landfill had a large ditch which contained many odd materials, including several oil barrels and grease pails (Figure 5). The origin of these was not clear, but they probably came from the troop units.

Also worth noting was a grease pit where oily or liquid wastes were dumped; there was also evidence that some type of industrial sludge had been dumped there. This is a definite problem area in terms of the EPA-proposed regulations and, in fact, may already constitute a violation.

Red bags, indicating infectious waste, were also found at the landfill.

Fire Department

The fire-fighting chemicals used by Installation B's fire department are listed in Table 11. None of these have any specified shelf life and are kept until used.

The biggest problem the fire department has is contaminated soil at the practice fire fighting area. This area has a circular dyke in which water is used to float waste or contaminated fuel. The fuel is then ignited and put out by the fire fighters. Much of the fuel is left standing in the dike after fire training is over and subsequently leaks out into the surrounding area. The contaminants include JP-4 (a kerosene-based jet fuel) and many fire fighting chemicals. There were also several barrels of contaminated fuels waiting to be used, some of which were leaking. This practice has apparently been going on for a long time, since the soil here is extensively contaminated. Removal of the contaminated soil will be a problem (Figure 6).

DFAE Shops

Motor Pool Storm Drainage Runoff. An oil separator in the DFAE motor pool area is used to remove oil from surface water. The separator collects waste oil by using a skimming process and absorbent material. A diagram showing its operation is shown in Figure 7.



Figure 5. Oil barrels and grease pails -- Installation B.

Table 11
Fire Department Supplies -- Installation B

Stock No.	Nomenclature
NA	Aqueous film-forming foam (AFFF)
NA	Halon fire extinguisher 1301
NA	Halon fire extinguisher 1211
4210-00-752-9343	Dry chemical fire, fire extension; potassium bicarb (five 50-lb cans)
NA	ABC-ammonium phosphate
NA	Super Kein-siliconized potassium chloride

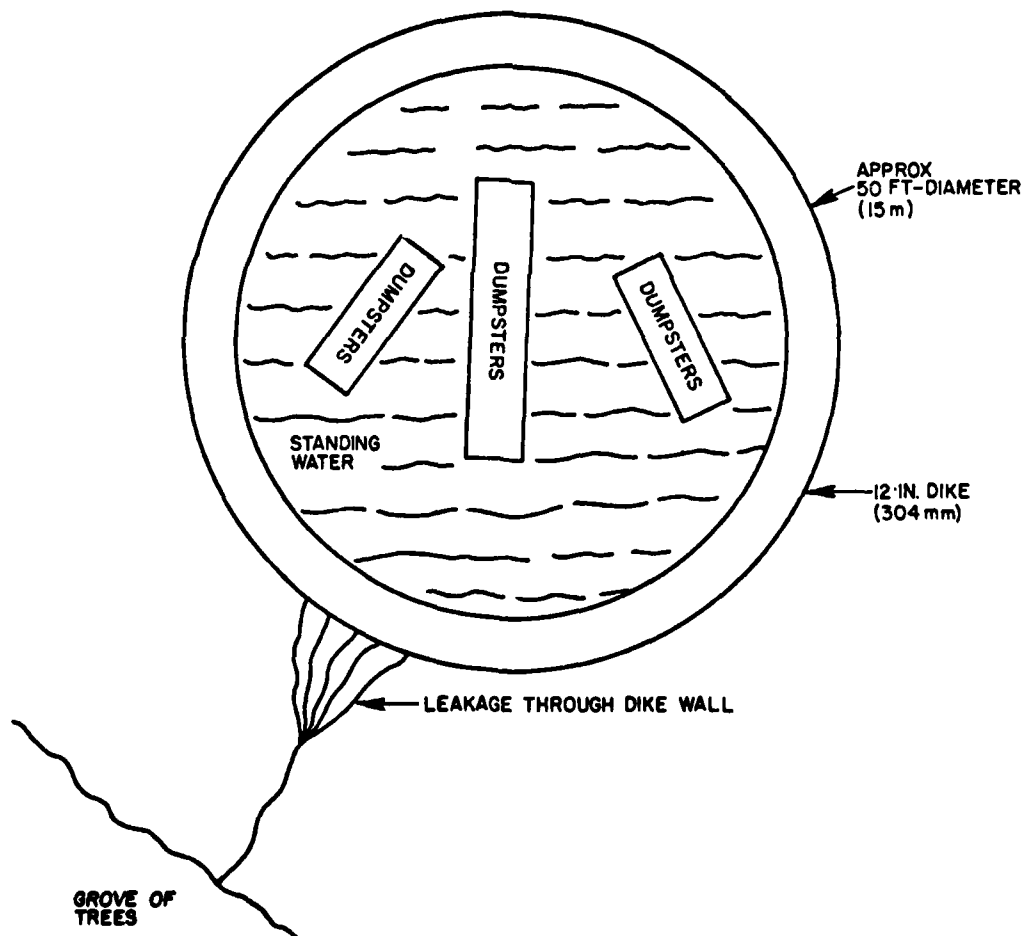


Figure 6. Diagram of fire training area.

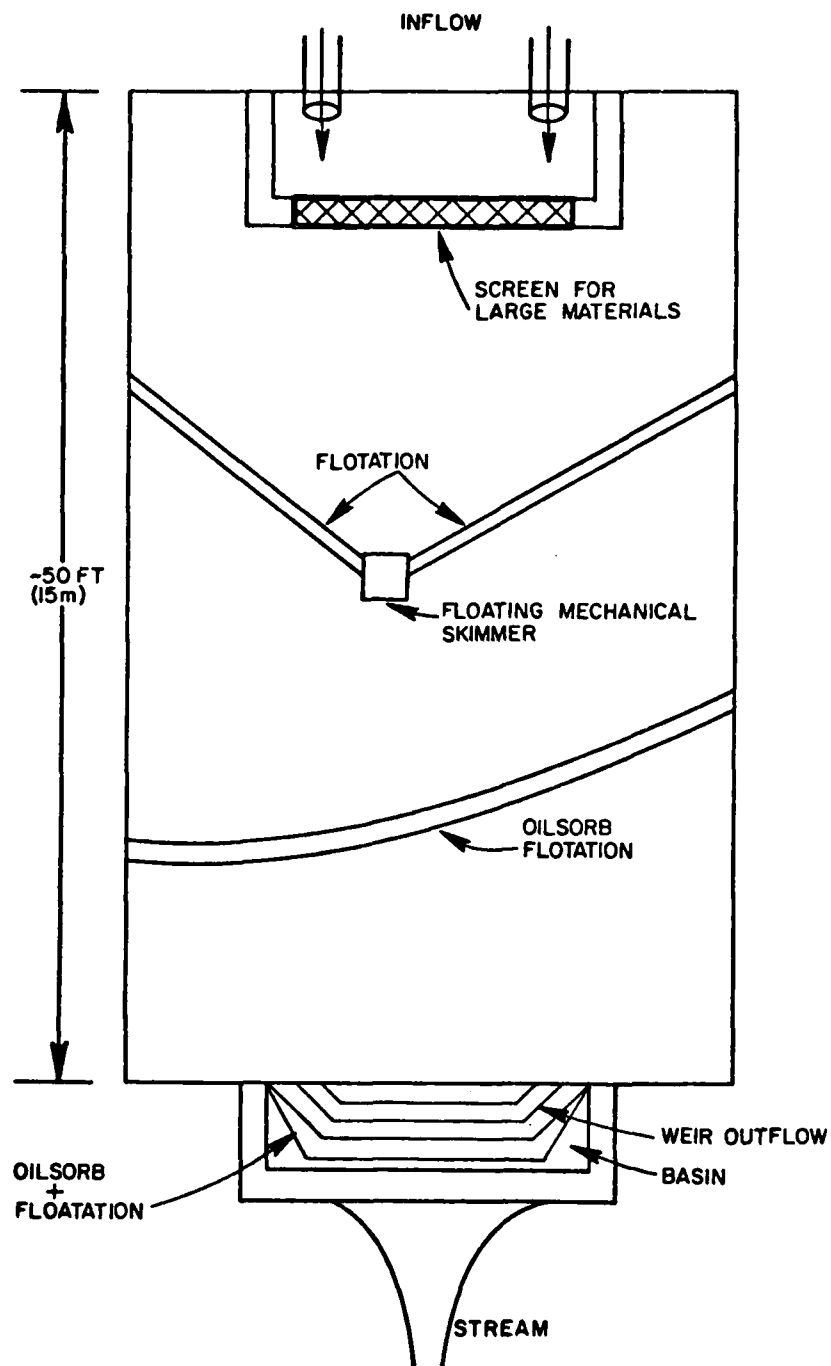


Figure 7. Diagram of oil-water separating pond -- Installation B.

Paint Shop. The most notable difference between this paint shop and the one at Installation A is the facility for silk screening, a process that uses vinyl-based paints.

Also notable is the fact that this shop uses waterfall paint booths, where the overspray from painting is impinged on a film of water flowing down the back wall of the booth. Effluent from these booths is discharged into a floor drain; its ultimate disposal is unclear. Appendix F lists the materials in stock at Installation B's paint shop.

Electrical Shop. Installation B's DFAE electrical engineer estimates that there are 100 transformers, designated as H-1 type, containing 60 gal (227 L) each of PCB-based dielectric oil. When in service, these transformers are located in underground concrete vaults. When the transformers become unserviceable, they are simply sealed in the vault. The survey team observed several of these transformers leaking. Also observed were several transformers of another type which had been dumped off a truck outside the exterior electrical shop. It was not known whether these contained PCB, but they will constitute a serious problem if they do (Figure 8).

Command Chemical (CC). The CC at Installation B is responsible for handling potentially dangerous chemicals issued to the troops. These chemicals consist mostly of decontaminating agents, decontaminating kits, riot control agents, etc.

The biggest problem encountered at CC was the lack of guidance on how to dispose of potentially hazardous agents when they become outdated or contaminated. The most recent publication on proper disposal of these chemicals was published in 1969, and clearly does not account for recent increases in environmental awareness.⁸ The most common field advice for disposal of these chemicals is to burn them.



Figure 8. Electrical shop transformers -- Installation B.

⁸ *Storage, Shipment, Handling, and Disposal of Chemical Agents and Hazardous Chemicals*, Army Technical Manual (TM) 3-250 (Department of the Army, March 1969).

G-4 Maintenance Battalions

The maintenance battalions at Installation B have duties similar to those at Installation A. The personnel in charge of Installation B's maintenance battalions gave the survey team a list of the amount of supplies required to operate a G-4 battalion for about 30 days (Table 12). The survey team was told that the battalions use a figure of 10 percent to account for spillage, loss, and general wastage of POL-type products.

Tours of maintenance areas revealed hazardous waste problems similar to those of any area where vehicles are worked on, i.e., POL spillage and improper disposal of POL or POL containers. During the inspection tour, the survey team witnessed an actual spill of diesel fuel. The fire department was called to wash down the spill, but had not responded by the time the inspection was completed. Diesel fuel was observed entering the storm sewer.

The survey team also found an oil recycling tank which was overflowing. The problem was partially caused by the DFAE recycling program's refusal to take the oil because it was contaminated with water. (Contamination apparently results when the covers are consistently left off by field personnel.) Contamination of soil in this particular area was severe.

It is worth noting that the conditions in maintenance yards seem to depend directly on the attitude of the officer in charge of that particular yard. An officer who is diligent about cleaning up spills and keeps a clean house will have a better yard.

DIO

The DIO at Installation B has a large complex of repair and industrial operations located in the same area but not under the same roof. In several places throughout the buildings, vapor degreasers were in use. The sludge from these degreasers was put into barrels and probably landfilled. Small cans of spray lubricant and solvent were used in all shops.

Installation B uses a small package industrial waste treatment plant to clean effluents from DIO maintenance facilities. A diagram of the plant is shown in Figure 9. Influent to this plant consists mainly of paint booth sludges and waste oils; the flow into the plant is highly variable. The effluent goes into a blind ditch and is allowed to percolate into the ground. The blind ditch is only about 20 ft (6.1 m) from a small stream and pond where people fish. The survey team was told that no effluent goes into the pond, but an oil sheen was visible on the water's surface. The origin of this oil is unclear, but it is quite possible that it comes from the treatment facility. The ultimate fate of the separated sludges is also unclear.

This facility has a caustic soda dip tank for cleaning steel and iron parts and a tank of Zep aluminum cleaner for cleaning aluminum parts. Sludge disposal from these tanks would be prescribed under the EPA-proposed regulations. The facility also has a battery shop, which recharges and fills lead-acid batteries. The main concern here is the disposal of the batteries, which contain lead, and inadvertent spillage of sulfuric acid electrolyte (sodium bicarbonate is used to neutralize old electrolyte).

When the survey team inspected dumpsters outside the DIO buildings, they found one dumpster entirely filled with paint cans, paint slops, rags, etc. The DIO painting area uses waterfall paint booths, the effluents of which go to the industrial waste treatment plant.

Small Arms Shop

This shop is in the DIO complex and conducts complete weapon rebuilding on many types of small arms. It uses such chemicals as chromic acid and phosphoric acid and has a vapor degreaser. The operator is under tight security and an accounting must be made for all materials. Materials used in the small arms shop have the potential to cause severe environmental problems; a diagram of the process is shown in Figure 10.

Appendix G lists materials found in Installation B's DIO buildings.

Table 12

G-4 Battalion Supplies -- Installation B

NSN	Nomenclature	UI	Required for 30-Day Supply
4710-00-933-4413	Tube, polyethylene	BG	12
6810-00-238-8119	TTN 95	GL	40
6810-00-2785	MEK TTM 261	GL	52
6810-00-664-0387	OT 620	GL	10
6850-00-281-1986	Solvent PD 680	DR (55 gal)	4
6850-00-066-2330	Rust Lick 1606	GL	20
6850-00-139-5297	Rain repellent	GL	8
6850-00-142-9582	Oil, lube	TU	12
6850-00-181-7954	Engine soap	CN (5 gal)	12
6850-00-223-9067	Naptha, aromatic	GL	6
6850-00-264-6573	Desiccants act.	CN	6
6850-00-264-9038	Cleaning solvent	DR (55 gal)	10
6850-00-285-8011	PD 680	DR (55 gal)	4
6850-00-543-7415	Denatured alcohol	GL	12
6850-00-570-9355	Cleaning compound	BT	72
6850-00-901-0591	Anti-icing fluid	CN (12 oz)	72
6850-00-935-0995	Oil, lube	GL	20
7930-00-985-6911	Detergent, general	CN (5 gal)	2
8010-00-584-2426	Primer coating	CN (12 oz)	72
8010-00-899-8825	Zinc chromate primer	CN (12 oz)	72
8030-00-082-2425	C 8514	GL	20
8030-00-087-8630	T 5544 B	LB	16
8030-00-244-1298	Corrosion, prev, compound	CN (5 gal)	12
8030-00-616-9191	Seal compound, S8784	GL	800
8030-00-664-4019	Seal compound	PT	12
8030-00-597-5367	Anti-seize compound MIL-A-907	CN (2.5)	4
8040-00-152-0016	Epoxy resin	KT	12
8040-00-941-9984	RTV 106	TU	240
8040-00-944-7292	Adhesive kit, episeal 20-20	KT	50
9150-00-057-8976	Grease, lubriplate	LB	2
9150-00-149-7431	Hydraulic fluid G81322	QT	2400
9150-00-180-6266	L23699	TU	144
9150-00-181-7724	Grease, water	TU	288
9150-00-190-0907	GAA	CN (5 gal)	6
9150-00-233-6712	5 G659A	LB	16
9150-00-257-5370	Graphite grease	LB	12
9150-00-261-7899	VV P-216	PT	16
9150-00-273-2388	L6081	QT	48
9150-00-478-0055	GOB G25647	TU	300
9150-00-577-5844	GO-90	Cn (5 gal)	20
9150-00-616-9020	G25537B	LB	48
9150-00-753-4667	Lube oil compressor	QT	120
9150-00-754-2595	GMD	LB	60
9150-00-935-9807	H6083H	QT	48
9150-00-935-9809	Hydraulic fluid	QT	144
9150-00-944-8953	G81322	CN	48
9150-00-985-7099	L23699	QT	1544
9150-00-989-7246	GIA	LB	24
9150-00-149-7432	Luboil MIL-L 7808	QT	1440
9150-00-252-6383	Hydraulic fluid MIL-4-5606C	QT	580
9150-00-145-0268	Grease MIL-G-81322A	CN (5 lb)	20
9150-00-985-7247	Grease MIL-G-23827A	CN (5 lb)	20
9150-00-189-6727	Luboil OE/HDO/10	QT	2142
9150-00-186-6668	Luboil OE/HDO/10	CN (5 gal)	694
9150-00-191-2772	Luboil OE/HDO/10	DR (55 gal)	108
9150-00-186-6681	Luboil/HDO/OE/30	QT	4486

Table 12 (Cont'd)

NSN	Nomenclature	UI	Required for 30-Day Supply
9150-00-188-9858	Luboil OE/HDO/30	CN (5 gal)	1474
9150-00-189-6729	Luboil OE/HDO/30	DR (55 gal)	220
9150-01-035-5393	Gear oil 80/90 WT	CN (5 gal)	584
9150-01-035-5394	Gear oil 80/90 WT	DR (55 gal)	82
9150-00-190-0904	Grease, GAA	LB	280
9150-00-190-0905	Grease, GAA	CN (5 lb)	800
9150-00-190-0907	Grease, GAA	CN (35 lb)	306
9150-00-935-1017	Grease, GAA	CA (14 oz)	270
9150-00-180-6266	Luboil A&E	CN (8 oz)	404
9150-00-985-7099	Luboil A&E	QT	1802
6810-00-249-9354	Battery acid	GL	402
6850-00-181-7933	Antifreeze	CN (5 gal)	488
6850-00-181-7940	Antifreeze	DR (55 gal)	142
9150-00-231-9071	Brake fluid	GL	1406
9150-00-249-0908	Grease, ball bearing	CN (35 lb)	532
9150-00-698-2832	Hydraulic fluid	QT	3068
9110-00-263-9865	Heat tablets	BR	99986
9150-00-186-6699	Luboil Low-30	QT	268
9150-00-186-6705	Luboil Low-40	QT	380
9150-00-935-9807	Hydraulic fluid	QT	12
9150-00-935-9808	Hydraulic fluid	GL	24
9150-00-935-9809	Hydraulic fluid	CN (5 gal)	6
9150-00-577-4512	Hydraulic fluid	GL	12
9150-00-985-7234	Luboil 2110TH	CN (5 gal)	8
6810-00-597-3608	Methanol, technical	CN	8
2910-00-646-9727	Ether, M539254	CN	18
6850-00-926-2275	Deicer	PT	216
6810-00-930-6311	Trichloroethane	CN	12
9150-00-753-4886	LSA	GL	96
9150-00-949-0323	LSAT	TU	432
6850-00-264-9037	Solvent, dry cleaning	DR (55 gal)	28
9150-00-111-6255	FRH	GL	10
6850-00-245-2356	Solvent, superlube	DR (55 gal)	12
6850-00-224-6663	Rifle bore cleaner	GL	30

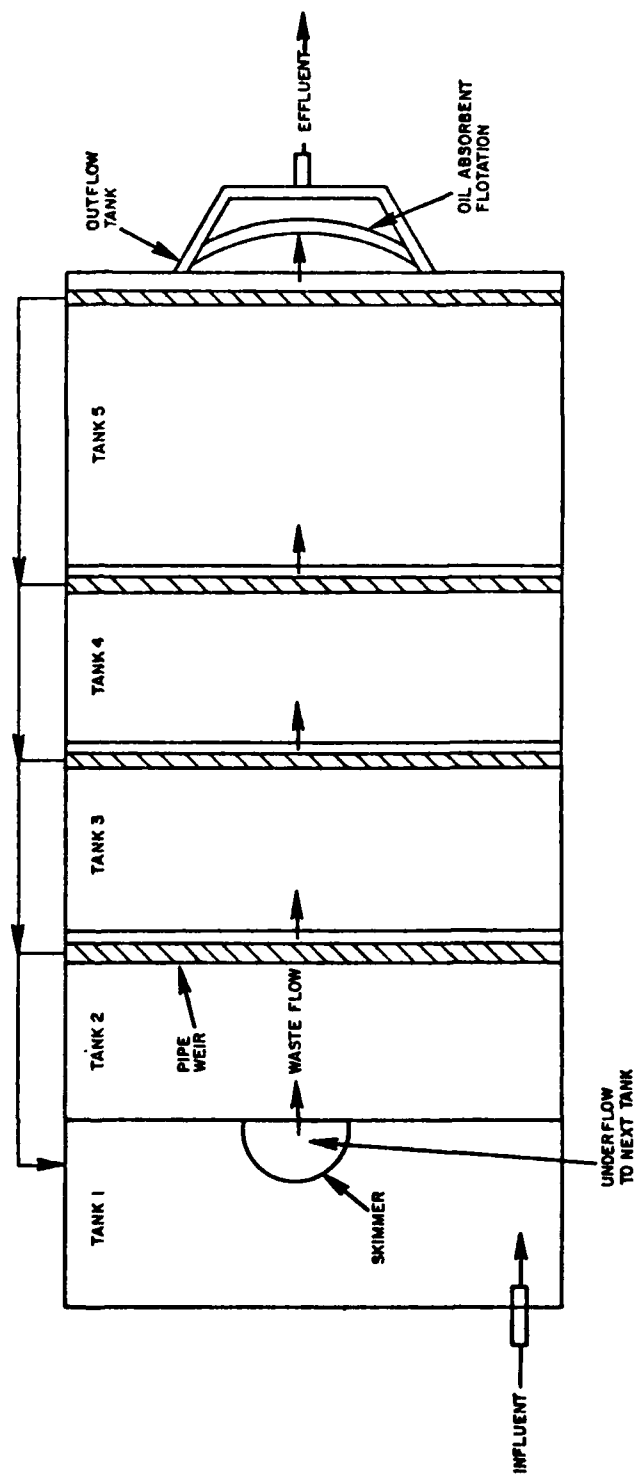


Figure 9. Industrial waste treatment -- separator skimming back tank 1 (Installation B).

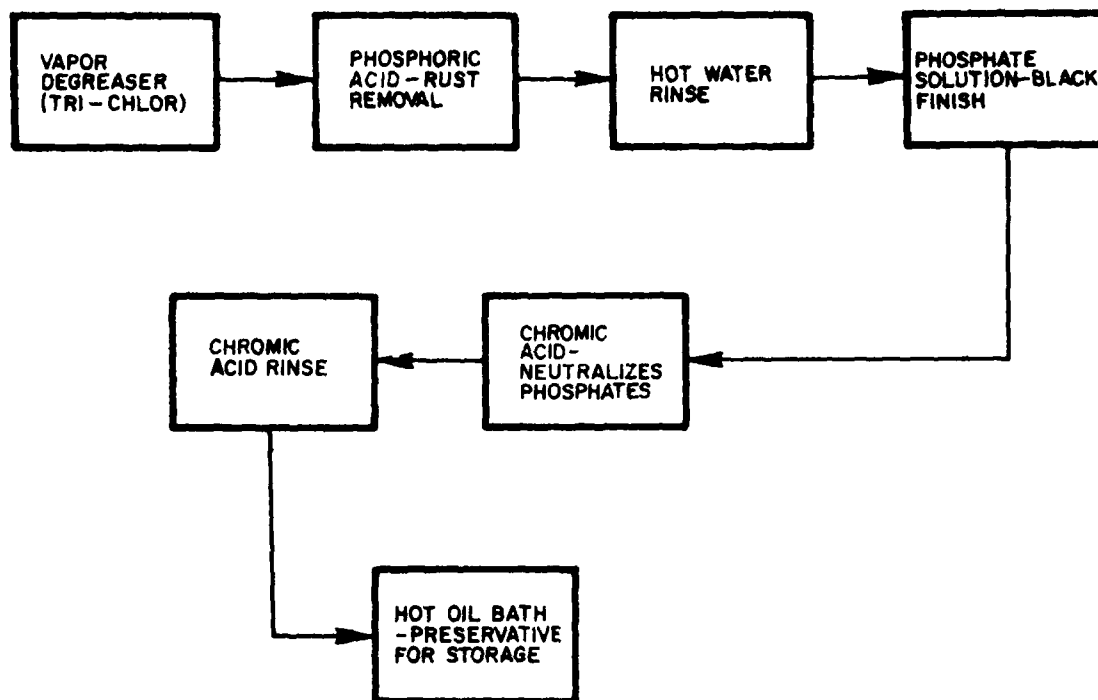


Figure 10. Diagram of small arms cleaning operation.

Laundry

The base laundry at Installation B is run by the DIO; it does normal and dry cleaning for the entire installation. Many of the processes involve the use of soda (NaOH) and corrosive chemicals (Table 13). Containers (mostly 100-lb bags) for these chemicals are generally disposed of in a dumpster. The survey team observed partially filled bags and waste oil (from gear boxes used to clean machines) in the laundry dumpsters. A storage shed for flammables, located outside the laundry, contained paints, oils, solvents, and chlorine bleach. Many of the corrosive materials used at Installation B's DIO laundry would be a problem under the EPA-proposed regulations.

Table 13

Laundry Materials -- Installation B

Stock No.	Nomenclature	Quantity
NA	Sodium orthosilicate -- anhydrous	Ten 100-lb bags
NA	Vouch heavy-duty nonphosphorus detergent	Seven 55-lb bags
6810-00-174-6581	Sodium hydroxide, technical grade	--
56810-00-264-3937	Oxalic acid, dihydrate	--
7930-00-924-5366	Ammonium hydrogen fluoride	Six 100-lb cans
6850-00-550-2830	Cleaning compound, solvent	55-gal drum

Entomology Shop

The entomology shop at Installation B has the same type of materials as the entomology shop at Installation A. Only two exceptions are noted: (1) there are four barrels of 2,4,5-T in storage at the shop, and (2) the entomology shop is not in control of DDT products. As noted before, extreme care should be taken in the disposal of these materials.

Solvent-Refined Coal

An experimental solvent-refined coal plant is being operated at Installation B by a private contractor. Although disposal of the wastes from this plant is not an Army responsibility, it is still worthy of attention.

The treatment of liquid industrial waste at this plant is very good. The waste is first treated using alum flocculation and bubble flotation. It is then treated biologically using a high-temperature aerobic stabilization and filtered through pressurized sand beds and activated carbon. The quality of the plant's effluent is very good.

The disposal of solid wastes is questionable, however. As shown in Table 14, most of these process wastes go into a municipal landfill. Sulfur, waste filter sand, and waste-activated charcoal are the major waste materials. Leaching these materials creates a potential hazardous waste problem, particularly in light of the soil types at Installation B, which allow water to leach through the landfill rather easily. If the EPA-proposed regulations are passed, disposal practices will have to change at this facility.

Installation B Survey -- Summary

The hazardous wastes found at Installations A and B were remarkably similar. By far the largest quantity of hazardous waste material was waste oil/POL.

Both solvent tank bottom sludge and paint wastes are generated and are typically disposed of in sanitary landfills. This practice will not be acceptable if the EPA-proposed regulations are passed.

A considerable amount of DDT is being stored in 55-gal drums. Although these drums show no signs of leakage, leakage is a possibility, especially the longer this material is stored.

PCB transformers are not now being disposed of as recommended by current EPA regulations on PCBs.

Table 14
Solid Waste Disposal List

Types of Solid Waste	Source	Volume	Storage Provision	Removal Frequency	Final Disposal
Off-specification coal	Plant raw material	Variable to 9 T/month	Off-spec pile	Variable	County landfill
Off-specification SRC	Plant product	Variable to 27 T/day	Off-spec pile	Variable	County landfill
Sand	Waste treatment sand filters	7.3 m ³ /year	Off-spec pile	Variable	County landfill
Activated charcoal	Waste treatment charcoal filters	9.9 m ³ /year	Off-spec pile	Variable	County landfill
Asphalt-coated rocks	Process area of plant	Variable	Off-spec pile	Variable	County landfill
Alum sludge	Primary clarifier waste treatment	11.3 m ³ /month	2500-gal waste tank	Monthly	Hazardous waste disposal sites
Skimmings	Primary clarifier and flotation unit waste treatment	5.6 m ³ /month		Monthly	
Excess digested biomass	Biological unit waste treatment	14.1 m ³ /month	None	Variable	Sanitary sewer system
Paper and similar refuse	Office support facilities	Variable	Dumpsters	Weekly	Diposal site
Mineral residue	Coal insolubles	Variable to 3.6 T/day	Drum storage	Variable	Hazardous waste disposal sites
Tank bottoms	Storage vessels	Variable	Drum storage		Hazardous waste disposal sites
Sulfur	Sulfur recovery unit	Variable to 0.907 T/day	Drum storage	Variable	County landfill

6 ARMY HOSPITAL -- SURVEY DESCRIPTION

The Medical Center surveyed is a tenant activity on Installation B. It was constructed during 1943 and 1944 and is a one-story brick structure consisting of 88 separate buildings with approximately 3 km of interconnecting ramps and corridors.

The Medical Center staff examines and treats more than 1 million patients annually, providing full medical and dental services for active duty and retired Armed Forces personnel and their dependents in a five-state area and to military patients transferred from other areas. The staff includes 400 officers (160 of whom are medical doctors), 600 enlisted, and 800 civilians. During the past year, the Medical Center had an average bed occupancy rate of 344 patients per day with a high of 362 and a low of 296. The average daily outpatient load was 2,260 patients.

Survey Findings

Categories of potentially hazardous waste identified at the Army Medical Center are: (1) solid waste, (2) sewage, (3) pharmaceutical waste, (4) radioactive waste, and (5) chemical waste.

Solid Waste

Hospital personnel have chosen to divide their solid waste into two categories: infectious and noninfectious. The infectious waste is placed in red plastic bags and the noninfectious into black plastic bags.

Infectious Solid Waste. This category consists of (1) significant laboratory waste, including all tissue or blood elements, excreta, and secretions obtained from patients or laboratory animals and disposable fomites,* (2) surgical specimens and attendant disposable fomites, (3) similar disposable materials from outpatient areas and emergency departments, (4) equipment, instruments, utensils, and fomites of a disposable nature from isolation rooms, (5) animal feces, animal bedding, supplies, and fomites resulting from and/or exposed to infectious animal care and laboratory procedures, and (6) all disposable needles and syringes.

Each area of the Medical Center which generates infectious waste is supplied with 167 heat-resistant yellow plastic containers for the red plastic bags containing infectious waste. The red plastic bags are sealed when full and placed in the yellow containers. When the yellow containers are full, the lids are secured and the containers placed at designated pick-up points.

The yellow containers are picked up twice daily by hospital housekeeping personnel and transported to an incinerator adjacent to the Medical Center. Here the yellow containers are opened and the red bags segregated into high-risk and low-risk infectious waste. The high-risk infectious waste is incinerated and the low-risk infectious waste is transported by the same personnel to the sanitary landfill.** The judgment as to which bags will be incinerated and which bags will be placed in the sanitary landfill is made by the housekeeping personnel based on two criteria: (1) their knowledge of which department the waste originated from, and (2) the type of waste.

The Medical Center activities which generate predominantly high-risk infectious waste are: general surgery/recovery, vascular surgery, plastic surgery, pathology, blood bank, microbiology, labor and delivery, obstetrics, emergency room isolation, and the morgue. Other clinical activities generate both high- and low-risk infectious waste in variable proportions. About 900 kg of infectious waste is generated from the Medical Center daily. Of this amount, 540 kg is incinerated (high-risk) and 360 kg (low-risk) is placed in the sanitary landfill. Based on the average bed occupancy rate of 344 per day, the amount of infectious waste per bed per day is 2.6 kg.

* A fomite is any item that may harbor or transmit pathogenic organisms.

**The present incinerator does not have the capacity for disposing of both types of infectious waste. Approval has been given to purchase a new 225 kg/hour incinerator for the Medical Center which will dispose of all infectious waste and conform to clean air pollutant standards.

Noninfectious Solid Waste. Most wastes in this category are: (1) food waste from the military mess and cafeteria, and (2) office waste, i.e., paper products and small quantities of plastic, wood, metal, and cloth. The remainder of noninfectious waste is produced elsewhere in the hospital where the probability of contamination with disease organisms is low.

Approximately 2,676 m³ of solid waste is generated at the Medical Center each month and buried in the installation's sanitary landfill. This amounts to 18,000 kg of noninfectious waste per day or more than 45 kg per bed per day. The heavy outpatient load at the Medical Center (2,260 per day) may contribute significantly to solid waste production.

Sewage

Sewage is composed of wastewater and refuse derived from sinks, toilets, and urinals located throughout the Medical Center. The Medical Center produces about 700,000 L of sewage per day. The raw sewage is piped 8 to 10 km to the secondary treatment facility where it is mixed with sewage from the main installation. The treatment facility daily handles up to 38 million liters of sewage in winter and as little as 19 million liters in summer. This difference is presumably caused by the infiltration of ground water into the sewage during the winter when soil moisture levels are high.

Pharmaceutical Waste

Pharmaceutical waste is primarily outdated medicines (drugs, vaccines, and physiological solutions). Each month, two to three boxes of medications (excluding restricted or controlled drugs) weighing 9 to 14 kg each are buried in the sanitary landfill. Controlled or restricted drugs (hard drugs of known street value) are retained in their original containers and incinerated. Less than 0.5 kg/month of controlled or restricted drugs (loose pills not in their original containers) are flushed down the toilet by pharmacy personnel. Liquid pharmaceuticals are also kept in their original containers and incinerated.

Radioactive Waste

Radionuclides have several clinical uses in the Radiology Ward. The following approximate quantities of radionuclides are administered to each patient during treatment:

1. Brainscan or bonescan -- 20 millicuries of 99-M technetium (a short half-lived product of 99_{molybdenum}).
2. Blood studies -- 50 microcuries of 51_{chromium} (or 25 patients monthly).
3. Other -- 32_{phosphorus} is used once or twice a year.

Excreta from patients treated with radionuclides appear to be exempt from current disposal regulations.* The technetium has a short half-life (6 hours) and has little chance of causing significant contamination of sewage from patient wastes. The small amounts of radiochromium and cobalt are probably not significant contaminants. Some question remains about 131_{iodine} in patient discharges (feces, urine, and perspiration) during the first 24 hours after the dose is administered, when up to 50 percent of the radio-iodine may be excreted. Radio-phosphorus is apparently not excreted to any appreciable extent.

The bulk of the radioactive waste (14_{carbon}, 3_{hydrogen}, and 131_{iodine}) is generated by the Chemical Investigation Service, Nuclear Medicine and Clinical Pathology. Each month, three containers with an average of 0.165 millicuries of radioactive waste per container are shipped to a licensed disposal facility.

* *Rules and Regulations of the Nuclear Regulatory Commission*, 10 CFR 20.303d states: "Excreta from individuals undergoing medical diagnosis or therapy with radioactive material shall be exempt from any limitations contained in this section."

Chemical Waste

All clinical laboratory chemical wastes are discharged down the drain. The pressure from the heavy outpatient load prevented the clinical laboratory personnel from undertaking the complicated inventory of chemicals used in the test procedures.

General

From all observations, the Medical Center staff are conscientiously following prescribed procedures for the safe handling and disposal of hazardous medical wastes. The recent approval to purchase a new large-capacity pathogenic incinerator for disposing of all infectious wastes generated by the hospital will eliminate the need to distinguish between high- and low-risk infectious waste.

7 CONCLUSIONS

1. The major hazardous wastes found at two typical Army installations and an Army hospital were:

- (a) Waste oil/POL products
- (b) Solvent tank bottom sludges
- (c) Paint wastes
- (d) Pesticides and insecticides
- (e) PCBs
- (f) Medical/infectious wastes.

Other installations could have additional hazardous wastes as defined by the final EPA hazardous waste regulations.

2. The hazardous waste survey format developed and used during this study helps identify key installation personnel knowledgeable about potential hazardous waste problems and indicates the major activities which produce hazardous wastes at a military installation. This survey format can be used by installation FEs to conduct hazardous waste surveys.

APPENDIX A:

HAZARDOUS WASTE -- BACKGROUND INFORMATION

Alternatives for Hazardous Waste Management in Organic Chemical, Pesticides, and Explosives Industries, PB-278 059 (Environmental Protection Agency [EPA], September 1977).

An Evaluation of State Hazardous Waste Management in Region X; Dec 75, PB-262 673 (EPA Solid Waste Branch, 1975).

Demilitarization of Toxic Munitions at U.S. Army Materiel Command Installations PB-203 509-D (DOA Headquarters).

Dominguez, G. S., *Guidebook: Toxic Substances-Control Act* (CRC Press, Inc., 1977).

Defense Property Disposal Services IDMS Codes and Terms Pocket Reference (Defense Property Disposal Service, 1 October 1979).

Disposal of Dilute Pesticide Solutions, PB-261 160 (EPA, 1976).

Disposal of Waste or Excess High Explosives (U.S. Energy Research and Development Administration, June 1976).

Economic Impact Analysis of Anticipated Hazardous Waste Management Regulations on the Batteries, Electronics, and Special Machinery Industries, PB-280 117 (A. T. Kearney, Inc., February 1978).

Hanks, Thrift G., *Solid Waste/Disease Relationships, A Literature Survey*, Public Health Service Publication No. 999-UIH-6 (U.S. Department of Health, Education and Welfare, 1967) PB 216 480.

Hazardous Materials Waste Disposal -- A Bibliography with Abstracts, (Search Period Covering 1964) NTIS/PS-78/0619 (National Technical Information Service, June 1978).

Hazardous Waste Management Facilities in the United States -- 1977, EPA/530/SW-146.3 (EPA, January 1977) PB 262 917.

Model State Hazardous Waste Management Act (EPA, 1977).

Nemerow, Nelson, *Liquid Waste of Industry -- Theories, Practices and Treatment*, Addison-Wesley Publishing Company, 1971).

Program for the Management of Hazardous Waste, Vol I and II, PB-233 630 PB-233 631 (EPA, 1974).

Report on Ultra-Hazardous Substances at Federal Installations in Colorado, PB-255 253 (EPA, April 1972).

Report to Congress -- Disposal of Hazardous Waste U.S., PB-257 637 (EPA, 1974).

Report to Congress on Hazardous Waste Disposal, PB-258 518 (EPA, June 1973).

Sofield, Francis, et al., *Assessment of Industrial Hazardous Waste Practices, Paint and Allied Products Industry, Contract Solvent Reclaiming Operations, and Factory Application of Coatings*, PB-251 669 (Wapona, Inc., 1975).

A Summary of Hazardous Substance Classification Systems, EPA/530/SW-171 (EPA, December 1975) PB 261 086.

Toxic Substances, PB-245 378 (Council on Environmental Quality, April 1971).

APPENDIX B:

MATERIALS IN THE ENTOMOLOGY SHOP -- INSTALLATION A

Stock #	Nomenclature	Quantity
6840-00-926-1481	Dormant oil	1 drum
LSN	Malathion	3 drums
6840-00-242-4213	Klearol	1 drum
6840-00-270-8262	Linclave	1 pail
6840-00-655-5438	Chlordane	24 pails
6840-00-753-5038	Malathion	26 gal
6840-00-242-4219	Diazanone	3 pails
6840-00-825-7790	Lindane	5 pails
6840-00-965-2071	Karmex (Diuron)	50 lb
LSN	DAL-E-RAD-100 (DSMA)	50 lb
6840-00-026-9163	Weedazol (Amitrole)	12 lb
6840-00-033-2623	DIBrom (NALED)	1 drum
LSN	Baygon (PROPOXUR)	1 bag
LSN	CYANOGAS (Calcium Cyanide)	9 cans
LSN	Sunshine Odor Counteractant	1 drum
6840-00-815-2799	Amizine (Amitrole/Simazine)	50 lb
6840-00-664-7060	Diquat (Dibromide)	6 gal
LSN	DMA-4 (2,4-D)	NA
6840-00-890-1869	Brambicide (2,4,5-T)	50 gal
LSN	AATREX (ATRAZINE)	150 lb
LSN	CHEMPELS (2,4-D)	100 lb
LSN	PENTACHLOROPHENOL	36 gal
LSN	Creosote	30 gal
LSN	Lime, Hydrated	100 lb
LSN	Methyl Bromide	86-20 cc ampules
51-1-171-230	Emulsifiable Oil	5 pails
51-1-166-50	Calcium Polysulfide	1 pail
51-1-187-75	Lime, Sulfur, Calcium Thiosulfate	
6840-00-276-6200	Lead Arsenate	2 pails
LSN	Diazanone, 4E	7 cans
6840-00-276-6200	ULD BP 300 (Pyrethrin)	6 cans
	Insect Repellent	1 gal
	(Benzyl Benzoate)	
6840-00-543-7825	Chlordane	1 pail
6840-00-400-2140	PYRETHRUM (Pyrethrins)	6 cans
LSN	Gophacide (Zinc Phosphide)	6 bags
6840-00-252-0530	Chlordane	1 can
6840-00-844-7355	Diazanone	45 cans
NA	Sevin 50W (Carbaryl)	6 containers
LSN	Sevin (Carbaryl)	2 bags
LSN	Ortho Additive Oleate	6 bottles
6810-00-223-9069	Naptha, Aromatic	1 can
LSN	Isopropyl Alcohol	1 can
LSN	Round Up (Glyphosphate)	1 pail
LSN	Cyanogas (Calcium Cyanide)	75 lb
6840-00-753-4972	Rodenticide, Anticoagulant	18 cans
6840-00-753-4973	Rodenticide, Bait, Warfarin	3 cans
6840-00-498-4057	Baygon Bait	5 cartons
LSN	Smoke Control Concentrate	4 gal
6810-00-286-6018	Napthalene, Tech.	22 lb
LSN	Orthene (Acephate)	24 cans
6840-00-823-7849	Pyrethrins 0.6%/Allethrin 2.5%	14 cases
LSN	WLD BP-300 (Pyrethrin)	12 bottles
6840-01-027-3865	Baygon 1.5 (Methyl Carbonate)	8 cans
6840-00-242-4217	Lindane	7 boxes
LSN	Giant Destroyer (Sulfur)	2 boxes
LSN	DePester (Malathion)	100 lb

APPENDIX C:

MATERIALS IN THE DIO -- INSTALLATION A

Material	Location	Comments
Rustizide-ospho	Outside Bldg 8000	Two 55-gal drums (acid, rust remover)
Hydrochloric acid, technical grade	Generator shop	15 gal (57 L) used in steam cleaning
Stoddard solvent, bulk	Bldg 8000	Goes to recycle tank
Ni-Cd battery cells	Ni-Cd shop	Goes to PDO
Trichloroethane	Engine rebuilding shop	From vapor degreaser (sludge goes to landfill)
Trichloroethylene	Outside Bldg 8000	Used to be used in vapor degreaser
Caustic soda (NaOH)	Radiator shop	
Carburetor cleaner	Carburetor shop	Often used in place of Stoddard Solvent

APPENDIX D:

SUGGESTED PDO SEARCH FORMAT*

1. Federal stock classes that could generate toxic/hazardous waste

FSC	6505	8010	9150
	6610	8030	9160
	6820	8040	
	6830	9110	
	6840	9130	
	6850	9135	
	7930	9140	

2. Identifying commodities in IDMS

- a. Hazard listings
- b. Inventory listings
- c. Army DODAC Identifier -- A, C, W

3. DLSC (Battle Creek) can furnish all Army procurements in these classes.

4. DPDS (Battle Creek) could furnish all such disposals in these classes.

5. DPDO Generations:

- a. Army
- b. Navy
- c. Air Force
- e. Marine Corps
- f. National Guard
- g. Reserve Components

6. DPDO -- methods of disposal of wastes in landfills

- a. Chemicals (leakers, no utility or sales)
- b. Asbestos
- c. Plastics
- d. Rubber products
- e. Waste (paper/woods/wood fibers/chemical fibers)

7. Location of these items in our system:

- a. Warehouse
- b. Outside storage
 - (1) In various containers
 - (a) Drums
 - (b) Cans
 - (c) Packages (dry)
 - (d) Fuel tanks
 - (e) Refrigeration units
 - (f) Etc.

* Compiled by PDO officials at Installation B.

APPENDIX E:

MATERIALS AT CLASS III YARD -- INSTALLATION A

Material	NSN
Decontaminating agent, STB	6850-00-664-0283
Decontaminating agent, OS2	6850-00-753-4827
Trichloroethane, inhibited	6810-00-476-5613
Ferric chloride, anhydrous, technical grade	6810-00-664-0283
Dry cleaning compound	6850-00-664-4804
Diethylene tri-amode	6810-00-995-4804
Acetone, technical grade	6810-223-2739 (FSN)
Cleaning compound, solvent	6850-00-224-6665
Cleaning compound, aircraft surface	6850-00-144-9816
Isopropyl alcohol	6810-00-885-6160
Denatured alcohol	6810-00-201-0907
Methanol	6810-00-275-6010
De-icing fluid	6850-01-039-3842
Insecticide, aerosol, pyrethrin	6840-823-7849 (FSN)
Insecticide, diazanon	6840-00-844-7355
Insecticide, resmethrin	6840-00-149-0106

APPENDIX F:

PAINT SHOP STOCK LIST -- INSTALLATION B

Item No.	Stock Number	Nomenclature	Unit	Authorized Quantity
1	8010-00-754-2608	Latex Ext White	GL	16
2	8010-00-598-5733	Latex Int White	GL	16
3	8010-00-132	Latex Int Off White	GL	8
4	8010-00-384	Latex Ext Chrome Green	GL	4
5	8010-00-385	Latex Ext Brown	GL	4
6	8010-00-131	Latex Enamel	GL	4
7		Enamel Int White	GL	8
8	8010-00-297-0584	Enamel Semi-Gloss White	GL	4
9	8010-00-664-4761	Enamel Int-Ext White	GL	4
10	8010-00-133	Enamel Int Off White	GL	4
11	8010-00-527-2050	Enamel Ext Black	GL	4
12	8010-00-579-9201	Enamel Flr & Deck Grav	GL	8
13	8010-00-18	Enamel Vermilion Red	GL	8
14	8010-00-54	Enamel Ext Cream	GL	4
15	8010-00-598-3306	Enamel Int Cream	GL	4
16	8010-00-597-8193	Enamel Semi-Gloss Green	GL	4
17	8010-00-527-3194	Enamel Chrome Green	GL	4
18	8010-00-165-6111	Lacquer Clear Spray	GL	4
19	8010-00-69	Lacquer Flat White	GL	4
20	8010-00-70	Lacquer Gloss White	GL	4
21	8010-00-71	Lacquer Gloss Black	GL	4
22	8010-00-73	Lacquer Flat Black	GL	4
23	8010-00-87	Lacquer Sanding Sealer	GL	4
24	8010-00-68	Primer P.V.A.	GL	4
25	8010-00-130	Primer Red Oxide	GL	4
26	8010-00-67	Primer Red Surfacer	GL	4

Item No.	Stock Number	Nomenclature	Unit	Authorized Quantity
27	8010-00-281-2809	Primer Int Enamel Undercoat	GL	4
28	8010-00-282-9414	Primer Ext Wood	GL	4
29	8010-00-74	Stain Ext Brown	GL	4
30	8010-00-597-8225	Stain-Int Walnut	GL	4
31	8010-00-598-7669	Stain-Int Maple	GL	4
32	8010-00-75	Tint Raw Sienna	Ea	2
33	8010-00-76	Tint Burnt Sienna	Ea	2
34	8010-00-77	Tint Raw Umber	Ea	2
35	8010-00-78	Tint Burnt Umber	Ea	2
36	8010-00-79	Tint Venetian Red	Ea	2
37	8010-00-80	Tint Lamp Black	Ea	2
38	8010-00-81	Tint Chrome Yellow Light	Ea	2
39	8010-00-82	Tint Chrome Yellow - Medium	Ea	2
40	8010-00-85	Tint Chrome Green Med	Ea	2
41	8010-00-86	Tint Thalo #59 Med Blue	Ea	2
42	8010-00-89	Tint Chrome Green Dark	Ea	2
43	8010-00-102	Tint Thalo #53 Green	Ea	2
44	8010-00-107	Tint Bright Red	Ea	2
45	8010-00-16	Alum High Heat	GL	4
46	8010-00-160-5852	Spar Varnish	GL	4
47	8010-00-597-8234	Paint Remover	GL	6
48	8010-00-242-2089	Enamel Thinner	GL	12
49	8010-00-160-5787	Lacquer Thinner	GL	12
50	8010-00-90	Alcohol	GL	4
51	8020-00-260-1304	2-In. Brush	Ea	12
52	8020-00-597-4770	3-In. Brush	Ea	12
53	8020-00-597-4784	4-In. Brush	Ea	12
54	8020-00-122	Cover Enamel	Ea	12
55	8020-598-4080	Cover Latex	Ea	12

Item No.	Stock Number	Nomenclature	Unit	Authorized Quantity
56	8020-00-597-4759	Roller Kit	Ea	12
57	8010-00-900-2937	Traffic White	GL	8
58	8010-00-900-3647	Traffic Yellow	GL	8
COLOR GUIDE BASES INT LATEX				
59	8010-00-401	3650 Hi Hide	GL	4
60	8010-00-389	2260 Tint Base	GL	4
61	8010-00-390	2262 Accent Base	GL	4
62	8010-00-391	2270 Deep Base	GL	4
EXTERIOR LATEX				
63	8010-00-403	2350 Hi Hide	GL	4
64	8010-00-392	2300 Tint Base	GL	4
65	8010-00-393	2310 Deep Base	GL	4
66	8010-00-394	2320 Accent Base	GL	4
SEMI-GLOSS ENAMEL				
67	8010-00-402	1400 Hi Hide	GL	4
68	8010-00-395	4200 Tint Base	GL	4
69	8010-00-396	4210 Deep Base	GL	4
70	8010-00-397	4220 Accent Base	GL	4

APPENDIX G:

MATERIALS FOUND IN THE DIO -- INSTALLATION B

Material	Location	Comments
Sulfuric acid Electrolyte	Battery shop	Corrosive
Sodium bicarbonate	Battery shop	Used to neutralize sulfuric acid
Desiccant packs Bagged MIL-D-3844 (Type 1)	Bldg 9580 (engine shop)	Used in engine rates to absorb moisture
Lube oil	Bldg 9580 (outside)	About 20 barrels, source leaking
Trichlorethane	Bldg 9580 (outside)	3 barrels
Zep aluminum cleaner	Bldg 9580	Dry chemical dissolved in water
Caustic soda bath	Bldg 9580	Sodium hydroxide mixed 2 lb/gal (0.91 kg/L) in hot tank
Steam cleaning compound	Bldg 9580	Twenty 125-lb (57-kg) barrels with "warning: contains alkalies"
UDM-2	Radiac area (Bldg 9580)	Radioactive source
Radioactive wastes	Concrete building outside Bldg 9580	Low-level type material
Phosphoric acid	Small arms shop	Corrosive
Chromic acid	Small arms shop	Corrosive, toxic
Phosphate solution	Small arms shop	--

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T. Mullen, B. Donahue. -- Champaign, IL : Construction Engineering Research Laboratory ;
Springfield, VA : available from NTIS, 1980.
59 p. ; 27 cm. (Technical report ; N-90)

1. Hazardous substances. 2. Waste products. 3. Military bases. I. Mullen, Timothy.
II. Donahue, Bernard A. III. Title. IV. Series: U.S. Army Construction Engineering
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